REVIEW AND APPROVALS

SHIAWASSEE NATIONAL WILDLIFE REFUGE

Saginaw, Michigan

ANNUAL NARRATIVE REPORT

Calendar Year 1989

Thomas J. Sousa 2/28/90
Refuge Manager Date

Refuge Supervisor Review 3/19/90
Date

John R. Eaton 3/26/90
Regional Office Approval Date

INTRODUCTION

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INTRODUCTION

Shiawassee National Wildlife Refuge was established in 1953, based on recommendations of the Migratory Bird Conservation Commission, to restore and enhance a historically important wetland area for the benefit of migrating waterfowl. Its formation resulted from the culmination of numerous land use proposals, and attempts over many years by various private conservation groups and governmental agencies. As a result of local and regional conservationist's initiatives toward reclamation (from marginal agriculture to natural habitats), the State of Michigan established the Shiawassee River State Game Area adjacent to the Federal refuge project. Together, these two areas encompass and practice complementary management on approximately 20,000 acres of some of the most valuable waterfowl habitat in the state. The refuge is 8,984 acres in size and is located in central Michigan about twenty-five miles south of Saginaw Bay.

The refuge is part of an area historically known as the "Shiawassee Flats", an extensive floodplain once rich in shallow water, marsh, and riparian vegetation with associated wildlife resources. Following a period of extensive timber harvest and coal mining in the area, agricultural development through ditching and draining began in the early 1900's. Five rivers converge at various points on the refuge that make the area prone to flooding, especially in the spring. This overflow bottomland/marsh habitat attracts concentrations of migrating waterfowl for which the area has become well known. With restoration of these wetland habitats and protection from human disruption, peak populations of 35,000 geese, 40,000 ducks, and 2,500 swan, high concentrations of wading and waterbirds, migrant and nesting bald eagles, and other wetland species are now common.

Wyandotte NWR, administered as a satellite of Shiawassee, was established by an Act of Congress in 1961 to "be maintained .....for migratory birds and other wildlife". It consists of two islands, Grassy and Mamajuda, and adjacent shallow water area approximately to the six-foot contour depth, totaling 304 acres, in the Detroit River just off shore from the cities of Wyandotte and Ecorse. From 1948 to 1961 the islands were controlled by the U.S. Coast Guard.

The Michigan Islands NWR, administered as a satellite of Shiawassee, was established by Executive Order in 1943 as a refuge and breeding ground for migratory birds and other wildlife. These three islands, Shoe and Pismire in Lake Michigan and Scarecrow in Lake Huron, are 2, 3, and 7 acres respectively in size, and are similar in character. A fourth island, Thunder Bay, was added to the refuge in 1965 by a U.S. Coast Guard/Fish and Wildlife Service agreement under a revocable permit (five-year renewal periods). The Service has secondary jurisdiction on 121 acres of the total 168 acres on Thunder Bay Island. Gull Island (230 acres) became the fifth island in the system in 1969 when it was ceded to the Service by the U.S. Coast Guard. The three original islands in the Michigan Islands NWR were designated as Wilderness Areas in 1970 under Public Law 91-504, Stat. 1104.

A. HIGHLIGHTS

- Shirley Wolfe retired after 13 years (Section E.1)
- The Shiawassee Flats Citizens and Hunters Association has become a positive asset (Section E.4)
- Renovation of Moist Soil 2 (Section F.2)
- Refuge deer hunt was a success (Section H.8)
- Installation of Moist Soil 3 and 4 pumping station (Section I.1)

B. CLIMATIC CONDITIONS

In contrast to the drought of 1988, excess water was a concern in 1989. Significant rainfall in May and June interfered with farming operations and hampered water management activities (Figure B1). While precipitation dropped off in July, approximately normal patterns prevailed through the remainder of the growing season. In general, temperatures were above normal (Figure B2), but did not reach record levels set in 1988.

C. LAND ACQUISITION

3. Other

The land exchange between the U.S. Fish and Wildlife Service and the Michigan Department of Natural Resource for a 49 acre tract within our boundary never transpired. The Michigan DNR Division of Wildlife did not want to be bothered with 49 acres on the northeast of the Federal refuge.

D. PLANNING

2. Management Plan

The station Wildlife Inventory Plan was revised and approved during the year.

4. Compliance with Environmental and Cultural Resource Mandates

The Corps of Engineers and the Michigan Department of Natural Resources were contacted to extend the permits to perform the necessary rehabilitation of Pool 1A. Because of problems with the minority contractor who was selected to do the work, the construction was not accomplished in 1989. New ideas and designs were being drawn up at the end of the year for construction in 1990.

Figure B1. MONTHLY PRECIPITATION IN 1988 AND 1989 COMPARED TO 1951-80 AVERAGES.

Sources: Averages - Fred Nurnberger, Mich. Dept. Agric.; Current Monthly - Sag. Water Works

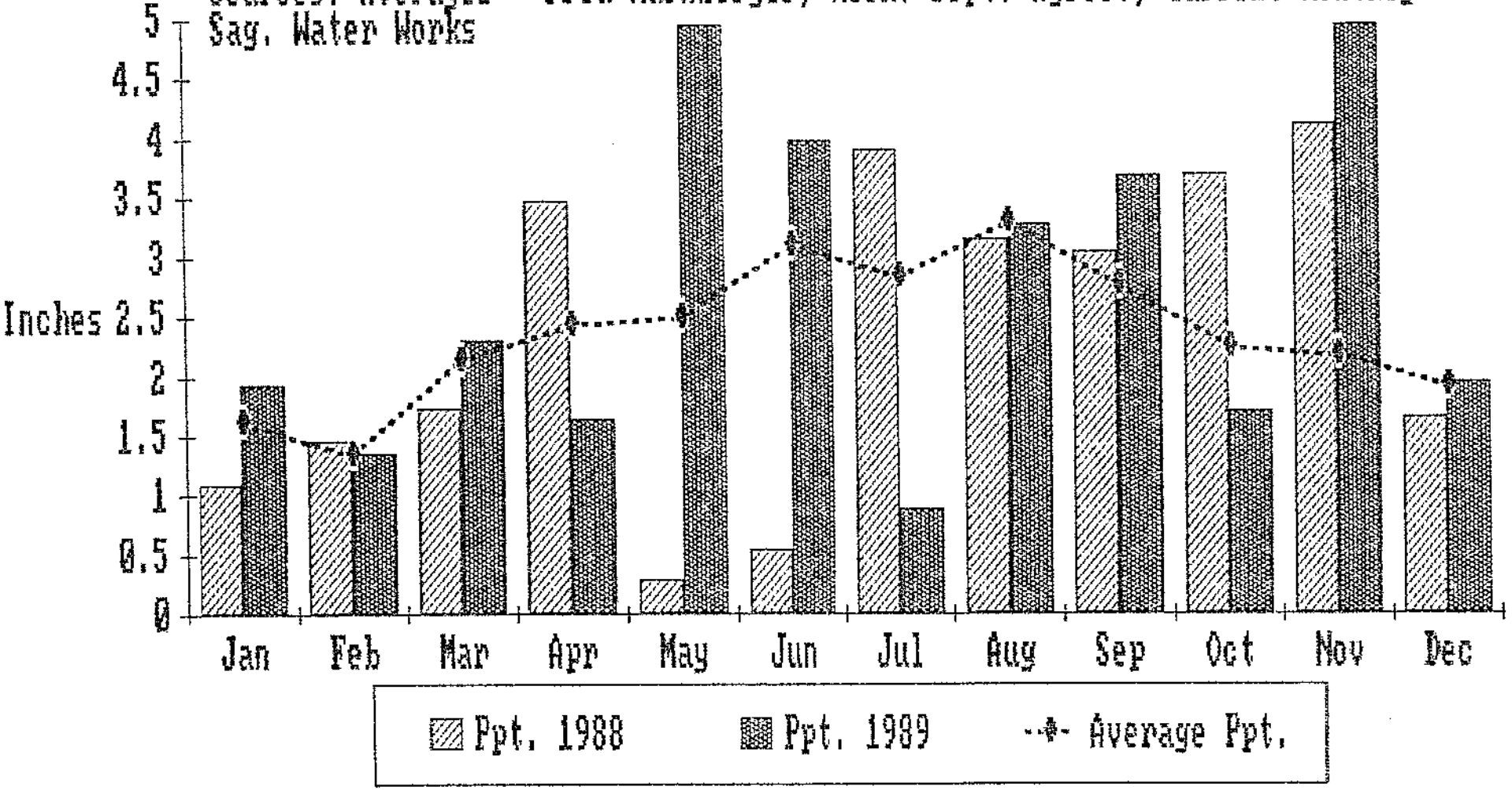
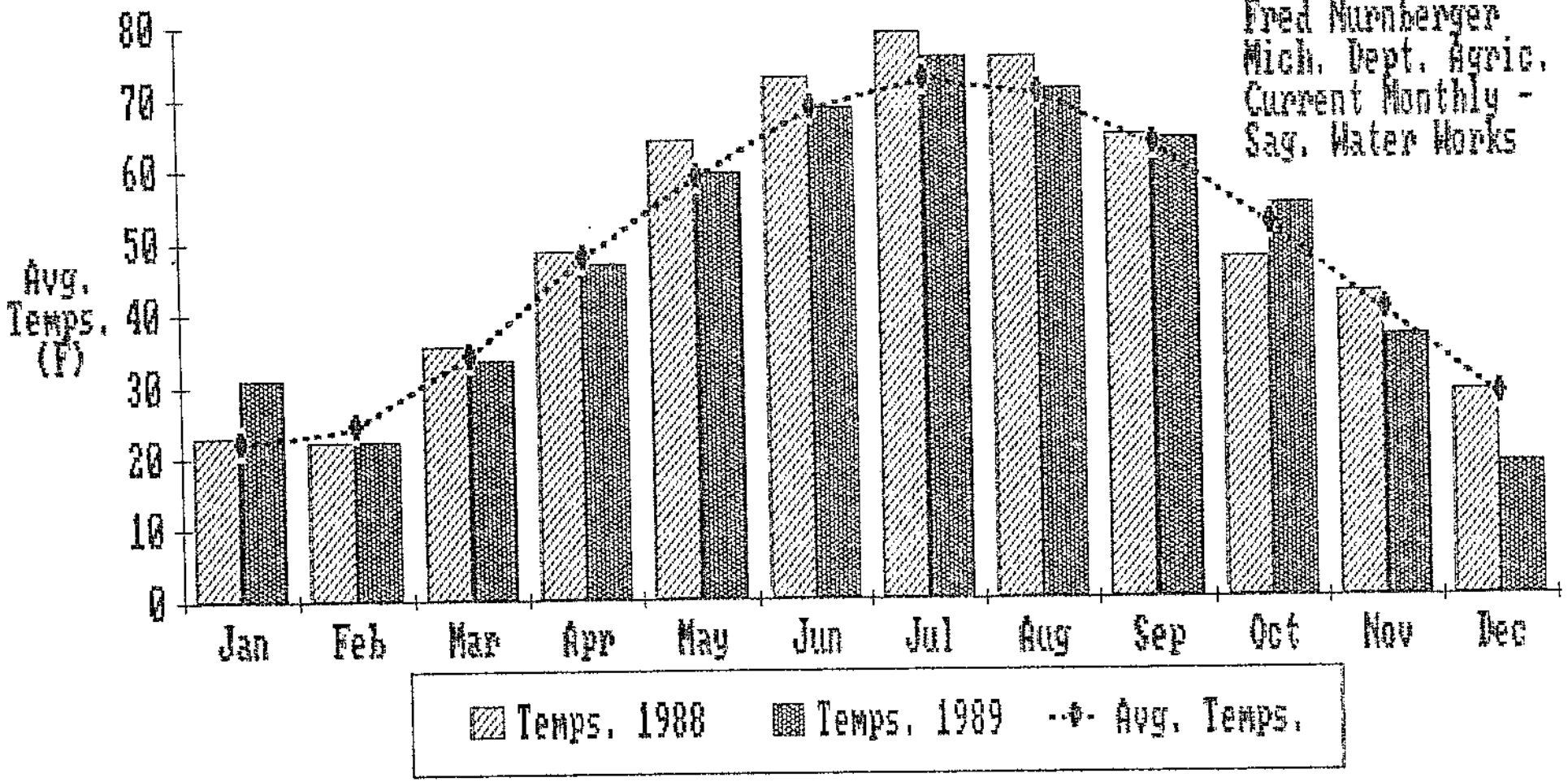


FIGURE B2. AVERAGE MONTHLY TEMPERATURES IN 1988 AND 1989 COMPARED TO 1952-80 AVERAGES.



5. Research and Investigations

The East Lansing Ecological Services Field Office continued with the contaminant analysis on Wyandotte and Michigan Islands National Wildlife Refuges. The results of their efforts should be available soon.

E. ADMINISTRATION

1. Personnel

1. Thomas F. Prusa, Refuge Manager, GS-12, PFT.
2. Edward S. Merritt, Refuge Manager, GS-11, PFT.
3. Richard A. Weide, Refuge Manager, GS-9, PFT.
4. Shirley L. Wolfe, Administrative Technician, GS-5, PFT; retired on 2/28/89.
5. Kimberly R. Titcombe, Administrative Technician, GS-5, PFT; entered on duty 2/13/89.
6. Lawrence J. Blazo, Maintenance Mechanic, WG-9, PFT
7. Marion L. Nowosatko, Maintenance Worker, WG-8, PFT

Staff Photo: 3,5,7,6,1,2 (1/90, PS)

Personnel Levels Over the Past Five Years

Calendar Year	Permanent Full-time	Permanent Part-time	Temporary
1989	6	0	0
1988	6	0	1
1987	7	0	0
1986	6	0	2
1985	7	0	0

-- Administrative Technician Shirley Wolfe retired after working for 13 years on the refuge. Before coming to the refuge Shirley worked for the Veterans Administration Hospital in Saginaw and for the Navy Department in Washington, D.C.

-- Kim Titcombe replaced Shirley as the Administrative Technician transferring from Wurtsmith Air Force Base in northeastern Michigan.

-- Refuge Managers Prusa, Merritt, and Weide attended the annual Law Enforcement Refresher at the Wisconsin State Patrol Academy in Fort McCoy from February 27th through March 3rd.

-- Refuge Manager Prusa assisted in an "open house" in Winslow, Indiana to answer questions for the proposed Patoka River National Wildlife Refuge from June 21st through the 24th.

-- Refuge Manager Prusa presented the staff with the Award of Safety Accomplishment he received at the Project Leader's Meeting.

-- Refuge Managers Prusa and Merritt attended the Project Leader's Meeting in Brainard, Minnesota from September 18th to the 22nd.

-- Biological Aid James Moore was detailed here from Ottawa Refuge for approximately four weeks to help out with our managed goose hunt.

-- Refuge Manager Prusa attended a week long continuing education program at Iowa State University from February 13th through February 17th.

-- Performance awards were presented to Maintenance Workers Blazo and Nowosatko and Administrative Technician Wolfe.

Retiring Administrative Technician Shirley Wolfe receives well deserved Special Achievement Award (2/89, RW)

-- Administrative Technician Titcombe attended the New Employees Orientation at the Regional Office from November 13th through November 15th.

-- Refuge Managers Prusa, Merritt, and Weide attended various sessions of the Mississippi Flyway Council meeting held in Saginaw from July 25th through July 30th.

-- Refuge Officers from Seney, Ottawa, and Shiawassee requalified with their service weapons on October 3rd. Firearms Instructors John Lindell and Jim Pearson flew in with Regional Pilot Bob Foster for the one day training session.

-- Refuge Manager Prusa received a suggestion award from the Region and from the Washington office for the magnetic volunteer signs used on volunteer vehicles while on the refuge.

2. Youth Programs

Seasonal laborers were again selected from the state run Michigan Youth Corps program. The 12 week program is particularly attractive because older, more versatile workers, 18-21 years of age, are available at no cost to the Service. The refuge serves only as a worksite. In 1989, overall planning and program direction was provided by Assistant Manager Weide. Significant accomplishments this year included dike and trail maintenance, fence removal, boundary posting, and seeding/mulching a rehabilitated dike. The four enrollees, Dan Benkert, Dave Port (field supervisor), Dan Gosen, and Brett Yatsevich, are shown in the accompanying photo.

MYC enrollees: Dan Benkert, Dave Port, Dan Gosen, Brett Yatsevich (7/89, RW)

MYC assisting with trail maintenance (7/89, RW)

4. Volunteer Program

Volunteer hours were up significantly this year, a 195 percent increase over 1988 (Table E1)! Substantial dike repair and clean-up efforts by area conservation groups and others were primarily responsible.

Table E1. 1989 volunteer program summary.

Volunteer Category	Hours	Individual/group
Maintenance	628	Alex Lichtenwald, David Peters, Pioneer Work and Learn Center, Shiawassee Flats Citizens and Hunters Association, Michigan United Conservation Clubs.
Biological Support	994	David Peters, Bob Grefe, Bruce Winchell, Gary Van Kirk, Bob Metevia, Jim Childs, Jim Moore, Ann Niederstadt.
Public Use Programs	141	Wilmur Anspach, David Peters, Bob Grefe.
Administrative Support	15	Shirley Wolfe
Total Contribution	1,778 hours	

Volunteer efforts by the Pioneer Work and Learn Center, a state funded camp for male juvenile offenders, ages 14-17 deserve special recognition. Significant progress was made this year in removing flood related trash/debris from dikes. The Center combines academic and trade-related education with high adventure wilderness trips (e.g. canoeing, backpacking, solo-camping), and community service projects. Objectives include encouraging cooperation, teamwork, and communication while developing self-esteem and discipline. Awareness of environmental issues/concerns is also cultivated.

Spring cleanup by Pioneer Work and Learn Center (4/89, RW)

Another first in 1989 was the effort made by the Shiawassee Flats Citizen's and Hunter's Association to repair a breached dike on the south side of Pool 4. Their objective was to salvage this once productive marsh and provide enhanced hunter opportunity during the fall waterfowl season.

Biological and public use support also increased in 1989. David Peters again set the pace, with significant contributions including wildlife surveys, special studies, trail sign maintenance, duck banding, and goose neck collar observations.

Volunteer Peters assists with trail sign maintenance (7/89, KT)

On December 5, regular volunteers were treated to a luncheon by refuge staff. Volunteer pins and Certificates of Appreciation were presented. All seemed to enjoy and benefit from the fellowship.

Regular volunteers excluding staff: Gary Van Kirk, Bob Grefe, Bill Anspach, David Peters, Alex Lichtenwald, Shirley Wolfe (12/89, KT)

5. Funding

Funds for fiscal year 1989 were adequate to "get by". The funding levels for the past 5 years are as follows:

Fiscal Year	Dollars
1989	275,984
1988	389,900
1987	273,500
1986	359,200
1985	293,000

According to printouts from Denver, run on 10-20-89 and reconciled with refuge books, the funding for fiscal year 1989 ended as follows:

1261 - +$563.85 within 0.32% of fund target
1262 - +$620.99 within 0.62% of fund target
4960 - 0.00
8610 - +$340.70
1120 - $2,980.00 of the allocated $3,000 was obligated

6. Safety

A summary of the 1989 safety program is presented in Table E2.

Table E2. Safety meetings, significant accomplishments, and accidents in 1989.

Month	Meeting Topic(s)	Accomplishments	Accidents
January	Winter vehicle and furnace maintenance, winter weather and hypothermia	Began testing for radon gas	0
February	Film: "Options to Live"*; battery safety	Continued building MSDS file; step test	0
March	Film: "Drugs, Drinking, and Driving"*	Primary Asst. certified as commercial pesticide applicator	0
April	Film: "A,B,C,D's of Portable Fire Extinguishers	----------	0
May	Tornado hazards	Annual "Safety and Health Inspection"	0

June	Staff attended 4-hour NSC Defensive Driving Course	Annual audiometric testing	0
July	Film: "Safety, Everywhere,All the Time"	Radon test results received - no health risk indicated	Minor accident involving refuge vehicle operated by seasonal employee
August	Film: "Attitudes and Emotions"	Eye wash station installed; volunteer certified on ATV	0
September	Film: "Clinical Rabies"	Second MSDS binder for shop	0
October	Film: "Plan Your Talks"	----------	0
November	Film: "Winter Driving Tactics"*	Vehicle related safety maintenance	0
December	Reviewed MSDS file	----------	0

*Defensive driving film.

Safety accomplishments during the year were often initiated by the safety committee, Assistant Managers Weide and Merritt. Also, for the second consecutive year, all staff received a regional "Award of Safety Accomplishment".

7. Technical Assistance

Technical assistance was provided to requesting and cooperating agencies, groups, and individuals on an on-call basis.

Refuge Manager Prusa remains a member of the Tri-County Mosquito Abatement Advisory Committee which meets four times a year.

Refuge Managers Prusa and Merritt and Ecological Service personnel, Bob Pacific and Cyndi Duda met with the SCS District Conservationist in Huron County to see about trying to save several hundred acres of wetlands along the Philps Drain. After a morning tour a meeting was held with the Drain Commissioner. Hopefully this ditch cleanout can be stopped to save the last area of "natural wetlands" in this county. The original drain was built around 1890 and has never been cleaned.

A request was received from Melvie Wong from Region 1 Division of Refuges to send slides of the refuge's "landscape". Refuge Manager Prusa took a roll of slides and sent them to Ms. Wong.

8. Other

Refuge Managers Prusa and Merritt met with the Flint River Dike Committee and the Spaulding Township Board of Supervisors to discuss the elimination of spillways on the proposed new dike construction to be done across refuge property. It was our contention that, according to the hydraulic data provided to use, the spillways were above the 50-year frequency flood and the project was for 10-year flood protection. Therefore, the spillways must be used in the new dikes and will be at a level way above the proposed protection.

Refuge Manager Merritt took and passed the Pesticide Certification Examination.

All pertinent documents necessary to issue a Right-of-Way permit for the Flint River Dike and Erosion Control Project were supplied to the Regional Office Realty Division. These documents included the Environmental Assessment, the Environmental Action Memorandum, and the Finding of No Significant Impact. The Right-of-Way Permit was subsequently issued.

Refuge Managers Prusa and Merritt met with Michigan DNR District Wildlife Supervisor Tom Prawdzik and two members of the Shiawassee Flats Citizens and Hunters Association to discuss the plans for the 1989 deer hunt on the Federal and State Wildlife Areas.

Refuge Manager Prusa made a courtesy visit to U.S. Congressman Bill Schuette's office and met with Karen McKeller, the Congressman's Administrative Aid. Prusa discussed, in general, various refuge operations and presented her a copy of the 1988 Annual Narrative.

Refuge Managers Prusa and Merritt attended the initial meeting of the formation of the Saginaw River Basin Watershed Council.

Regional Office Engineer Fred Beauvais and Max Boyle visited and met with Saginaw County Engineer Jim Lehman to discuss the possible alternatives to transport rip-rap over the bridge crossing the Spaulding Drain.

Refuge Managers Prusa and Merritt met with Saginaw County Sheriff Kelley and Captain McIntire to discuss various refuge operations and the closure of a refuge parking lot gate by the Sheriff's deputies.

Wildlife Associate Manager Crozier visited on June 1st and 2nd for the first time to become familiar with the area.

Refuge Manager Prusa met with the Shiawassee Flats Citizens and Hunters Association to discuss a couple of maintenance projects that the group may fund. The projects were the replacement of refuge gates and road gravel for Evon Road. Many of the group were not excited about funding maintenance projects but they were told, with our decreasing federal budget, these were two items that were of immediate concern.

Refuge Manager Prusa gave separate tours of the refuge discussing our management practices to Michigan DNR District Wildlife Supervisor Tom Prawdzik and Shiawassee River State Game Area Wildlife Technician Rex Ainsle. Refuge Manager Prusa also gave former manager Bob Johnson and Ray Rummell, a member of the Shiawassee Flats Citizens and Hunters Association, a tour of the refuge.

F. HABITAT MANAGEMENT

1. General

The levels of river systems that coverage on the refuge generally dictate habitat management options. The effect of Lake Huron with its "wind-tides" exacerbated already high river levels and resulted in high water/flooding over the refuge during much of the 1980's. Routine management activities were often hampered or prevented.

General weather patterns began to change in the late 1980's. As Lake Huron fell (Figure F1), excess water began to disappear from the refuge. Despite normal spring flooding, management capability returned. Examples include drawdown and renovation of permanent marsh, maintenance of forest openings and other early succession habitat, and improved access to many areas for loosestrife control. Refuge habitats are depicted in Figure F2.

Figure F1. Lakes Michigan-Huron water levels, 1988-90, compared with long term average.

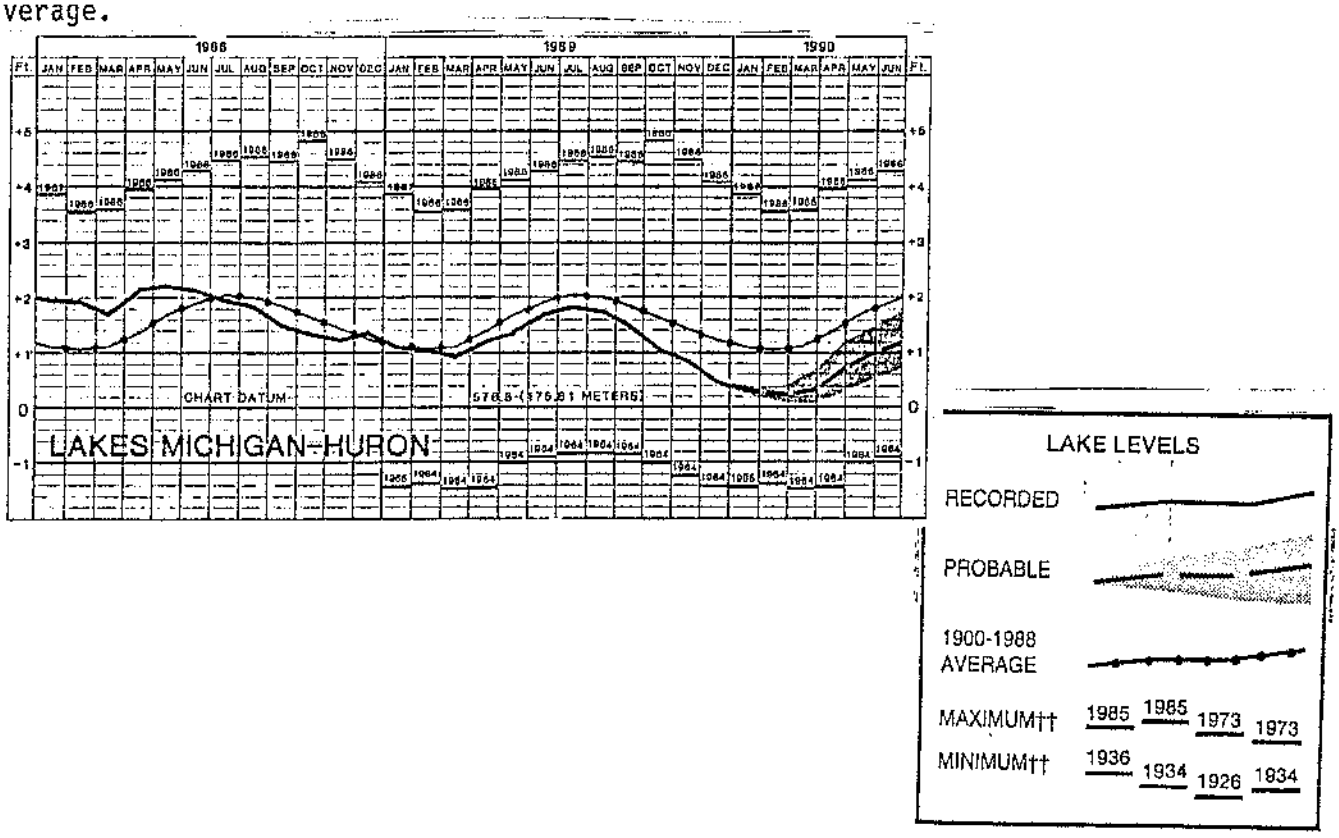
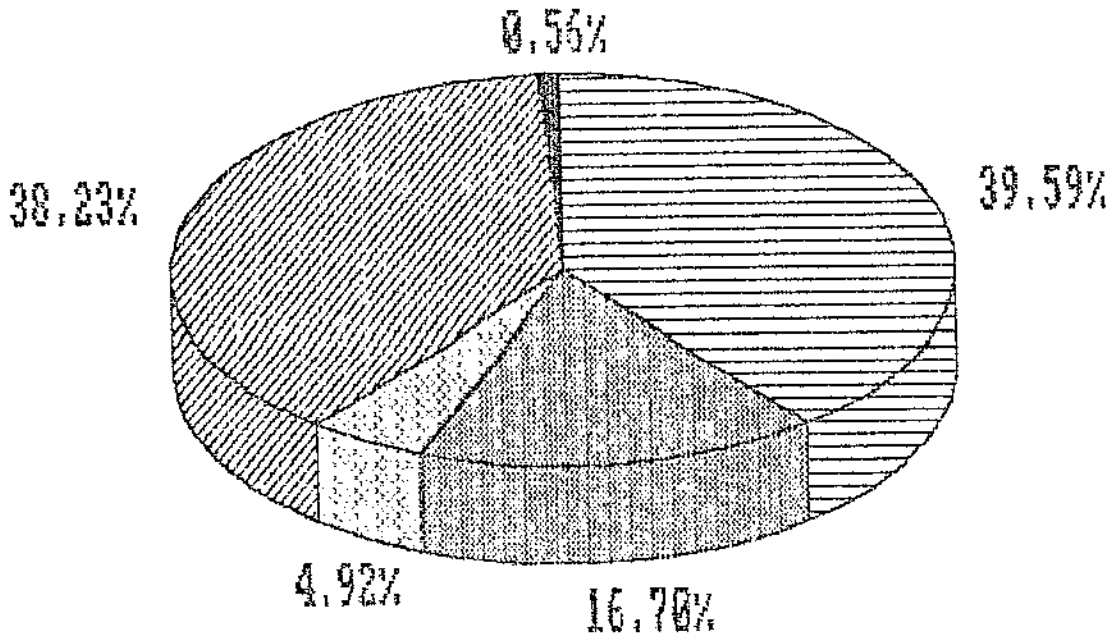
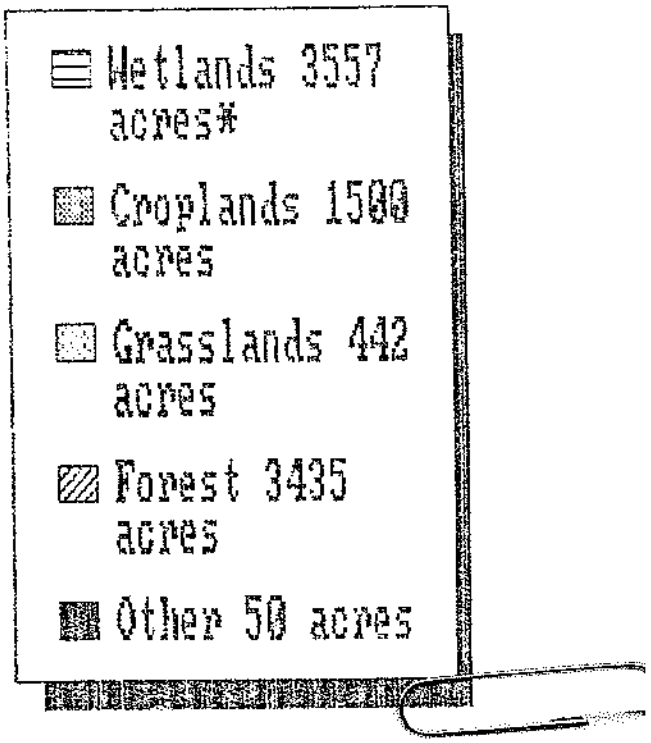


FIGURE F2. HABITATS OF SHIAWASSEE NATIONAL WILDLIFE REFUGE.





Total - 8984 acres

*includes greentrees

"Typical" spring flood washing into Pool 1A, with "typical" visitor from upstream (6/89, RW)

2. Wetlands

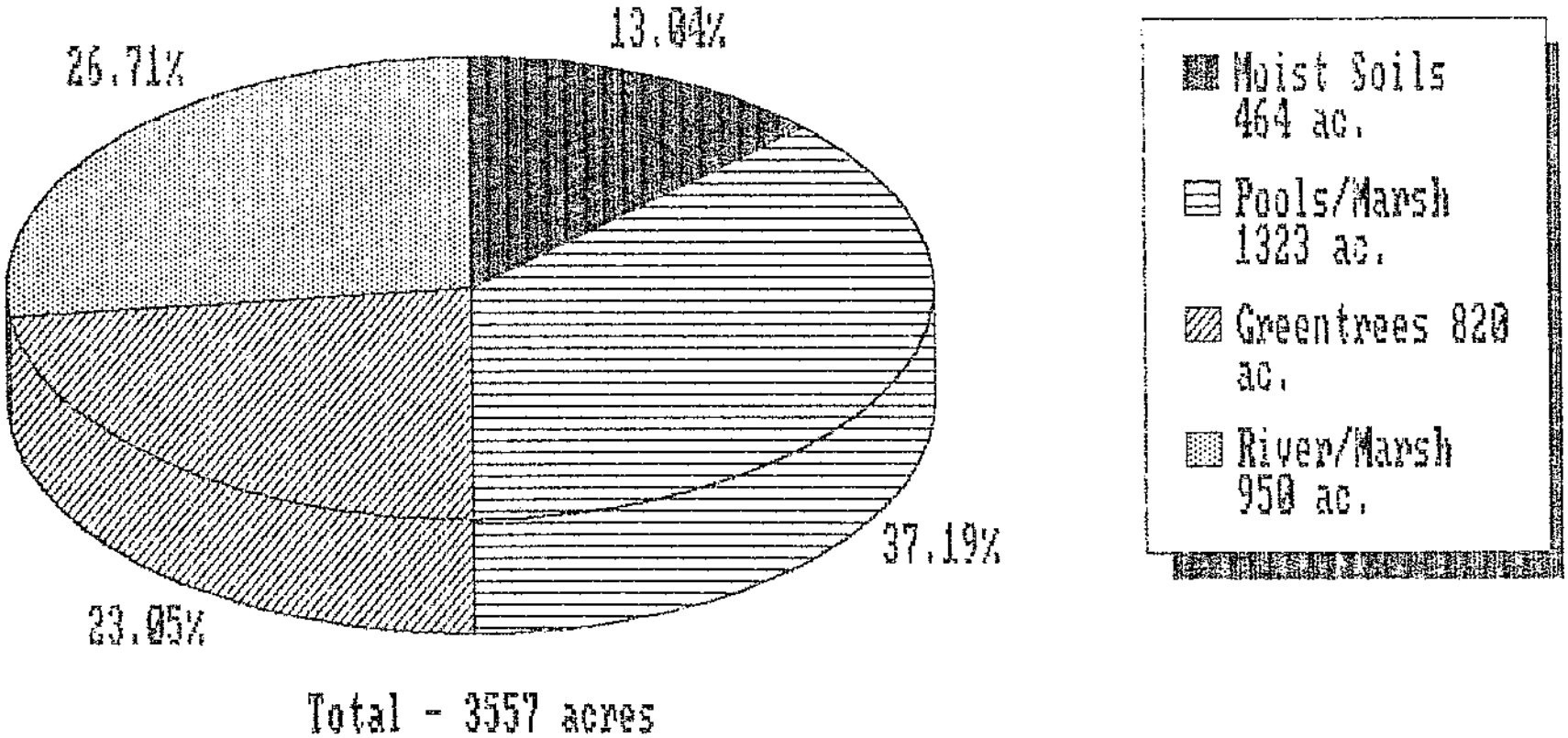
a. Refuge Wetlands

Figure F3 shows wetland types and indicates acreage and percent of total wetlands of each type.

(1) Moist Soil Unit 1

Most surface water was drawn off soon after spring breakup to stimulate invertebrates and provide habitat for migrating shorebirds. Excellent shore/marsh bird use resulted. Further dewatering in June stimulated a diverse moist soil community. However, woody species have encroached along the east side of the unit, and upland weeds (primarily cocklebur) were prevalent on drier sites. Pumping in late summer encouraged moist soil plants while retarding upland species. Shallow flooding in September attracted concentrations of about 5,000 ducks. Low river levels, however, prevented additional flooding and some habitat may have been underutilized.

FIGURE F3. WETLANDS OF SHIAWASSEE NATIONAL WILDLIFE REFUGE.



Moist Soil Unit 1 showing encroachment by woody species (6/89, RW)

(2) Moist Soil Unit 2

Renovation, followed by buckwheat on the north half and conversion to nesting cover over the remainder of the unit, was recommended in the 1989 Water Management Plan. As priorities changed in 1989 it was decided to plant the entire unit to buckwheat, and wait until 1990 for more radical land use changes. Heavy rains in May and June delayed renovation efforts until early July.

Beginning of end for cattails in Moist Soil Unit 2 (7/89, RW)

Buckwheat was finally planted on July 17. Weather was favorable and excellent seed production resulted by late summer. However, the ability to flood Moist Soil Unit 2, normally accomplished via gravity, was limited during fall months due to inadequate water in adjacent Moist Soil Unit 1. Waterfowl use of the buckwheat, was therefore, very limited.

Moist Soil Unit 2 planted to buckwheat after renovation (8/89, RW)

(3) Moist Soil Units 3 and 4

Initial spring attempts to dewater Moist Soil Units 3 and 4 to continue developmental work were delayed by heavy rains and high water. Floodwaters damaged the new (1988) exterior dike system. Favorable weather in late summer facilitated Evon Road work and completion of the pump station. Pumping in early fall increased water near the north end where emergents are dominant, but failed to flood moist soil plants to the south, particularly in Unit 3. Initially unknown to refuge staff, excess water leaked through a poorly designed stop-log structure at the north end of Unit 4. Ultimately, water was lost through a breached dike and leaking structure in North Marsh. Although fall waterfowl use of Unit 3 was limited, an estimated 5,000-10,000 ducks were observed using more favorable habitat at the north end of Unit 4.

(4) Pool 1A

As high water in area rivers receded by late June, Pool 1A was rapidly dewatered for proposed dike rehabilitation. Contracting and access problems caused delays forcing project postponement until 1990. Low water prevented subsequent reflooding, and a mix of moist soil, and upland plant communities, depending on site specific water regimes, developed. Disking in 1988 may have stimulated dense smartweed to appear over large areas this year.

Excellent smartweed response in Pool 1A (9/89, RW)

Unfortunately, loosestrife and woody species that became established last year in areas not disked were further encouraged by the drawdown in 1989. Limited flooding was possible by early fall as river levels rose briefly. Waterfowl use of flooded moist soil foods was impressive, with estimated peaks ranging between 35,000 and 45,000 ducks.

Flooded nutsedge in Pool 1A, showing dramatically improved water quality after elimination of carp (9/89, RW)

(5) Pool 1B

Rehabilitation of damaged screw gates was accomplished as planned in early 1989. High water in early summer, and other priorities later in the year, prevented planned renovation of pool bottom and islands in 1989. No attempt was made to flood the unit during the fall in the hope of starting island renovation during winter months. Marginal habitat consisting of a mix of upland and woody species, and the lack of water, precluded significant avian use during the fall migration.

(6) Pool 2

Deteriorated dikes continue to prevent effective water management in Pool 2. Water levels generally fluctuate with the Shiawassee River. For the second consecutive year low river levels have left this unit relatively dry, limiting wildlife use. Rehabilitation of this unit, particularly the north dike, is cost prohibitive at this point, and the future of Pool 2 remains uncertain.

(7) Pool 4

Pool 4 continues to be inaccessible by land and, therefore, is unmanageable. Water levels, vegetation, and wildlife use are infrequently monitored. Leaking dikes and structures make water control virtually impossible.

Manager Prusa standing on breached Pool 4 dike during March flood (3/89, RW)

In an attempt to salvage remnant marsh values, the Shiawassee Flats Citizens and Hunters Association volunteered to sandbag a breach in the south dike. Floodwaters subsequently flooded the unit by early summer, and limited waterfowl and wading/marsh bird use was observed in August.

Shiawassee Flats Citizens and Hunters Association helping to repair breached section of Pool 4 dike (4/89, RW)

Purple loosestrife, probably encouraged by last year's drought, now appears widespread. Effective management of Pool 4 will depend on restoration of vehicle access. Replacement of the Miller Road bridge, however, is unlikely in the short term due to high cost and other priorities.

June flood washing over new Pool 4 dike repairs (6/89, RW)

(8) North Marsh

Flood damage to new exterior dike around North Marsh (6/89, RW)

Less than one year after construction, a spring flood breached the new exterior dike on the east side of North Marsh. Despite gradual water loss from leakage, and intentional drawdown to facilitate construction associated with Moist Soil Units 3 and 4, impressive wading/marsh bird and waterfowl brood use was noted during the summer. Fall pumping into Moist Soil Units 3 and 4 forced water through the crossdike structure raising the level of North Marsh. The flooded emergents, approaching optimum interspersion, provided excellent habitat as significant waterfowl concentrations used the marsh during fall months.

b. Farm Bill Activities

(1) Wetland Development Projects

Farm Bill work commenced in February with visits to county Soil Conservation Service offices for the purpose of screening Conservation Reserve Program acreage for potential wetland development sites. A subsequent mailing to landowners identified in the screening process was conducted. In addition, landowners not enrolled in CRP but controlling tracts with potential sites were contacted. Follow-up field inspections and meetings with landowners in March and April resulted in signed Wetland Development Agreements for eleven projects in four counties. Four projects in Saginaw County, located adjacent to the Shiawassee Flats State Game Area, were constructed through force account efforts. Small construction contracts for the remaining seven projects

were arranged in May and June. Ten wetland developments were completed at year's end. One project was put on "hold" until 1990 due to wet ground conditions at the site when construction began in September. Sites suitable for true restorations are virtually non-existent in our area. Mid-Michigan simply did not have the geological and glacial history necessary for emergent wetlands. Essentially, all four Saginaw County projects were creations. Sites suitable for restorations, and even enhancements, continue to elude us. As a result, our projects tend to cost more than true restorations. However, the wildlife response has been encouraging. Furthermore, we continue to vigorously pursue all opportunities to cost share these projects which helps hold expenses down considerably. Eight of the ten projects completed in 1989 included landowner cost sharing.

(2) Conservation Easements on Farmers Home Administration Inventory Properties

At year's end, 130 Conservation Easements on Farmers Home Administration inventory properties had been proposed in Michigan. Of that total, 102 are located within the 44 county Shiawassee Refuge Management District and 18 have been recorded. Shiawassee personnel were busy throughout late summer, fall, and early winter establishing corners, delineating boundaries, and posting these areas. Efforts were concentrated in Sanilac and Arenac counties and all posting was accomplished with the assistance of FmHA staff.

Boundary delineation, posting, monitoring, and management activities on Conservation Easements will result in a significant increase in station operating costs. Currently, total annual maintenance costs for all Conservation Easements in the Shiawassee Refuge Management District are estimated at $10,000 (excluding salaries). This estimate represents our best "guess" of ongoing boundary establishment and maintenance costs after initial posting. We estimate an initial cost of $28,000 to properly mark CE boundaries currently within our area of responsibility. Obviously, we are shooting at a moving target as costs will increase with the addition of new CE's.

(3) Swampbuster

Assistant Manager Merritt participated in Agricultural Stabilization and Conservation Service Commenced Conversion Hearings throughout the year. On December 6, Refuge Managers Prusa, Merritt, and Weide attended a hearing in Arenac County to review ten commenced decisions. One of the ten decisions to grant a "commenced" was opposed because it had not been actively pursued. The ASCS agreed to reverse their decision and deny the landowner commenced status in this case. Sufficient evidence was provided to support their decisions in all other cases. No requests were received from SCS District Conservationists regarding wetland determinations in 1989.

Significant dividends resulting from our involvement in Farm Bill activities have included an enhanced working relationship with other agencies, and an education regarding resource concerns outside the refuge boundary. In mid-August, as a result of working with the SCS in Huron County, we became aware of a large drainage district extension and clean-out project on the Willow River. The Philps Drain project, as planned, would destroy or degrade several hundred acres of prime wetland habitat and adversely effect a state game management area. Ironically, most of the landowners in the district, those who would be assessed for the bill, were opposed. Michigan's archaic drain codes don't operate on a democratic basis and the project was approved and scheduled despite local opposition.

Typical Willow River wetlands that will be lost due to Philps Drain project in Huron County (7/89, EM)

In mid-September, FWS personnel (Refuges and Ecological Services), met with Michigan DNR, SCS, and private conservation club representation to tour the Philp's Drain project site. Later that day, a meeting was convened with the Huron County Drain Commission, the primary contractor, and their attorney. Unfortunately, Michigan's Drain Code effectively ties our hands and the District is not even required to secure a permit due to a categorical exclusion under Section 404. It became apparent at the meeting that a workable solution addressing both resource and agricultural concerns was not possible. The only course of action remaining will be for the public to get involved in a lawsuit. The Michigan United Conservation Club (MUCC) is pursuing the matter through their legal department. MUCC is also actively involved in the larger issue of forcing a re-write of Michigan's archaic drain codes: a sorely needed change!

Verona State Game Area wetlands that will be lost due to lower water levels resulting from Philp's Drain channelization of the Willow River (7/89, EM)

3. Forests

Forest habitat, including greentree reservoirs, comprises 4,255 acres of bottomland hardwoods. Second growth, even aged stands dominated by soft maples and green ash, are most common. Oak and hickory can be found on selected sites. Wildlife use of forested habitat, in its current condition, is considered low.

a. Forest Management Plan

Forest habitat has been compartmentalized and continuous forest inventory plots have been established. In accordance with the 1986 Forest Management Plan, 15 to 20 acres are scheduled to be selectively cut, and another 5 to 10 acres clear cut, every 2 years.

In 1989, seven 2-acre clear cuts, to increase age class diversity, and two selective cuts (5 and 6 acres), to favor mast producers, were marked in Compartment 24. Proposed cuts were later cruised by Assistant Manager Weide and estimated average volumes ranged from 20 to 35 cords per acre. To increase edge, all cuts were set up with irregular boundaries, and selected trees were marked for girdling to favor cavity nesters.

Cruising timber or just practicing proper oral hygiene? (8/89, EM)

Because of the small size of cuts, and custom work involved, a competitive bid process was not used. Rather, a "Priority System", with the right to harvest timber granted to a previous permittee, was used as the most effective system to accomplish forest management objectives. Current stumpage rates were charged with the understanding that all timber harvested would be sold as firewood.

Contractor working in 2-acre clear cut (11/89, RW)

Finished clear cut showing irregular boundary (11/89, RW)

b. Greentree Reservoirs

Late winter/early spring high water, normally used to flood Pools 3 and 5 for spring migrants, was not sufficient in 1989. Low areas of Pool 3 filled with meltwater provided limited habitat. By the time late spring floods raised the level of the Spaulding Drain to permit gravity influx, most trees had leafed out and excessive flooding of greentrees was prevented. Units were gradually dewatered to planned levels, about 584.0 in Pool 3 and 584.5 in Pool 5, by early July. Water trapped in the old Ferguson Slough provided excellent early summer brood habitat for wood ducks. As in the previous 2, years low water left greentrees dry during fall months, again limiting waterfowl use.

Cardinal flowers reappeared this year in moist forested habitats (8/89, RW)

4. Croplands

Approximately 4,000 acres within the present-day boundary were under cultivation when acquired in 1953, and an extensive ditch and dike system had already been constructed. Most land acquisition occurred from 1954 through 1967. From 1954 until 1965, 1,500 to 2,000 acres were farmed. After a sizeable land purchase in late 1965, and continuing through 1972, approximately 3,000 acres were under cultivated. Heavy crop losses from flooding during 1972 to 1976 promoted

conversion to other land uses, and by 1978, cropland production had been reduced to 1,700 acres. Approximately 1,650 acres were farmed in 1984 under eight cooperative agreements.

Currently, approximately 1,500 acres are committed to crop production through agreements with five cooperative farmers. The primary objective is to provide food for migratory waterfowl in spring and fall. Farming is used periodically to rejuvenate moist soil units, preventing dominance by cattails and/or woody vegetation and to set back succession. Croplands are important in accommodating the Canada goose hunting program. Most hunting occurs from blinds located in standing corn adjacent to winter wheat fields (Section H.8.).

Seeding wheat as lure crop for hunting program (9/89, RW)

Cooperative Farming Agreements are renewed annually on all tracts. Cooperators provide all necessary farming equipment, labor, seed, and fertilizer, and conduct normal farming operations in return for the entire crop on 70% of the crop acreage for units not in the hunting program, or 75% in the hunted units. The different share rates are necessary to adjust for the added work required in setting up narrow corn and winter wheat strips (green browse) to accommodate hunting. Maintenance of four electric powered pump stations along with associated drainage ditches, culverts, and structures are the responsibility of the government. Cooperators pay all electric charges for pumping associated with the farm program.

Crop rotations resulted in 791 acres of soybeans, 417 acres of corn, 170 acres of green browse, and 138 acres of barley planted in 1989. All crop rotations are designed to break insect cycles and eliminate the need for insecticides. With the exception of scattered damage due to wet conditions at planting, yields were about normal for the area. In addition, Moist Soil Unit 2 was renovated, and approximately 150 acres were planted to buckwheat. Despite the late planting date of July 17, buckwheat production was excellent (F.2.a).

The 1989 growing season was the first time our cooperative farmers were restricted to the use of herbicides on the Region 3 pre-approved herbicide list. This change resulted in some consternation and anger but nothing fatal. Additional changes, some of which will be implemented next year, are necessary to achieve our soil husbandry, erosion control, and water quality goals. They are as follows:

1. Elimination of all fall tillage on soybean fields. Limit fall tillage on corn fields to chisel plowing with a set minimum residual cover target.
2. Grass buffer strips between fields and ditches require careful evaluation. Periodic renovation and maintenance of strips, with a focus on species composition, should be a high priority.
3. Remove 25% of cash crop acreage from production and convert to grass/legume permanent cover. Rotate every four years.
4. Require soil testing and restrict synthetic fertilizer input to maximum recommended by lab.
5. Ensure that herbicide applications do not exceed the recommended maximum application rate.

5. Grasslands

Abundant spring rain produced an excellent response in grassland units along Hart Road in 1989. The effects of prescribed fire in 1987 are probably also being realized.

- In contrast to past years, response in refuge grasslands in 1989 was encouraging (7/89, RW)

In most other areas, refuge staff struggle to maintain grass/early succession habitats against invading willow, cottonwood, and green ash. Small areas of open habitat are lost each year as woody species grow to an unmanageable stage. Flooding and persistent residual wetness often hamper efforts to develop and maintain grassland.

9. Fire Management

Prescribed burning efforts continue to be a low priority at Shiawassee. The usefulness of this management tool, in relation to station objectives, has been questioned in recent years. Flooding and general wetness of habitats limit the use of fire.

10. Pest Control

Purple loosestrife continued to spread in 1989 as low water provided favorable habitat. The absence of a seasonal biological aid prompted recruitment of a regular volunteer to assist with loosestrife control. An estimated 311 acres of moist soil habitat were monitored as loosestrife flowered by mid summer, and individual plants were spot treated with Roundup or Rodeo as appropriate. About 4.1 miles of dike were also treated. Total glyphosate used amounted to 72 ounces, compared with 18 gallons in 1988. This discrepancy can be accounted for by the reduced effort in 1989 due to a shortage of seasonal help, more selective applications, and the mechanical renovation of Moist Soil Unit 2.

Volunteer Peters assists with loosestrife control (8/89, RW)

Drawdown, followed by disking and/or plowing and seeding to buckwheat provided a quick and effective solution to severe loosestrife infestation of moist soil habitat. As part of Moist Soil Unit 2 is returned to moist soil management, it should be interesting to evaluate loosestrife response, and attempt more effective countermeasures.

Agricultural herbicides were used by five cooperators in the farming program on soybean and corn fields. The primary target weed species were velvetleaf, cocklebur, nightshade, and foxtail. Efforts continued to encourage cooperators to explore alternatives to herbicides, and the use of insecticides is prohibited. Attempts to minimize herbicide use through banded applications at minimum rates, crop rotations, cover crops, and increased cultivation continue. Conditioning over the years, however, is difficult to overcome. Beginning in 1989, only herbicides listed on the Region 3 pre-approved list were permitted.

Significant numbers of gypsy moths were trapped this year. According to office files, gypsy moths were last found on Shiawassee in 1985. The annual surveillance effort, in cooperation with the U.S. Department of Agriculture, involves eight trap sites. North of the Shiawassee River traps were nearly filled to capacity, indicating gypsy moth expansion from more heavily infested counties to the north.

Gypsy moth "harvest" from only one trap (9/89, RW)

Woodchuck control efforts are discussed under G.15, Animal Control.

12. Wilderness and Special Areas

Wilderness and special areas administered by Shiawassee are covered under Section M.

G. WILDLIFE

1. Wildlife Diversity

Managed marshes, moist soil units, greentree reservoirs, miscellaneous unmanaged wetlands, and farm units provide habitat for thousands of ducks, geese, and swans during spring and fall migrations. A variety of other wildlife such as shorebirds, wading/marsh species, raptors, and mammals also benefit from waterfowl habitat management.

Implementation of the Forest Management Plan in 1989 included numerous small silvacultural treatments designed to favor forest wildlife (Section F.3). Maintenance of early succession habitats, with a focus on grassland is also intended to favor wildlife diversity; Section F.5 discusses the problems associated with this effort.

2. Endangered and/or Threatened Species

a. Federal

Last winter's observed peak population of bald eagles was 13 on January 26th, including 5 adult and 8 immature. As 1989 drew to a close, this figure was eclipsed by a new peak of 16 (all immature) on December 13th. Of special interest this year was an immature bald eagle wearing a patagial marker, observed sporadically throughout the spring and summer. This individual was found to be part of a hacking program to reestablish breeding eagles in the state of Indiana.

For the fifth consecutive year, the refuge was home to one breeding pair of bald eagles. First observed on the nest February 23rd, flooding prevented regular monitoring and determination of the hatch date. Later observations revealed that the pair successfully fledged one eaglet. No attempt was made to band this year's production due to continued safety concerns over climbing the dead nest tree.

Unfortunately, for the second consecutive year, an immature bald eagle was found electrocuted. Power lines near Moist Soil Units 1 and 2 have become an unacceptable hazard. Negotiations with Consumer's Power to bury key segments of power lines continued at year's end.

A quick look at a peregrine falcon as it flew off the main dike rounded out the record of federally listed species observed in 1989.

b. State

Two species of tern listed by the State of Michigan as threatened, common and caspian, were observed during 1989. Individuals of these species were present for 9 and 12 weeks respectively. An osprey, also on the state threatened list, was observed briefly in June.

3. Waterfowl

a. Geese

About 5,000 geese were present last winter through February (Figure G1). In contrast to normal spring patterns, goose numbers appeared to drop off in March, with the observed spring peak 88 percent below the 1983-88 average. Birds may have been more dispersed during March flooding, including additional off-refuge use, or rapid spring movements prevented an accurate assessment of the spring goose peak.

Production by the few hundred resident giant Canadas appeared down from prior years. About 35 goslings were observed throughout the summer. Average production has been closer to 100 for the past several years. Spring flooding, deteriorated nest sites, and unstable conditions in Pool 1A may have been responsible for the decline.

The fall Canada goose peak of 20,267 was only 6 percent below the 1983-88 average, but remained well below the objective indicated in the 1978 Master Plan (see graph). Total use days, estimated at 1.3 million in 1989 also fell short of the objective level of 2 million. Because fall foods are not believed to be limiting, and because flyway populations have been relatively stable, objective levels for Shiawassee may not be realistic.

As in prior years, in cooperation with the University of Wisconsin, Madison, Cooperative Wildlife Research Unit, volunteers began recording Canada goose neckband codes in September. The established goal of 750 observations was surpassed by mid-December. Volunteer Peters, often fighting high winds and eye strain, again demonstrated exceptional dedication in the furtherance of station objectives.

Snow goose numbers were average again this year, with a peak of 100 recorded in November. An unusual cold snap in December eliminated all open water, and few birds remained at year's end.

b. Ducks

Spring duck use continues to decline. While Figure G2 shows 1988 and 1989 data relative to the 1983-88 average spring peak, this average is about half the normal spring peak in the 1970's. The reasons for this apparent long term decline are not clear. Continent-wide population changes, and climatic factors have probably influenced duck use at the local level. Refuge cropland was also reduced in the late 1970's, and again in the early 1980's. Finally, moist soil habitat was generally made available in the fall throughout much of the 1980's, further limiting spring foods.

Brood surveys in June and July provided data for the following production estimates: mallard - 30; wood duck - 115; blue-winged teal - 25. This was about half the estimated production in 1988. Flooding during incubation may have been a factor. In addition, the absence of seasonal help in 1989 resulted in reduced survey effort. Production from nest baskets was again

FIGURE G1. CANADA GOOSE PEAKS IN 1988 AND 1989 COMPARED WITH AVERAGE SPRING AND FALL PEAKS, AND FALL OBJECTIVE LEVEL FROM 1978 MASTER PLAN.

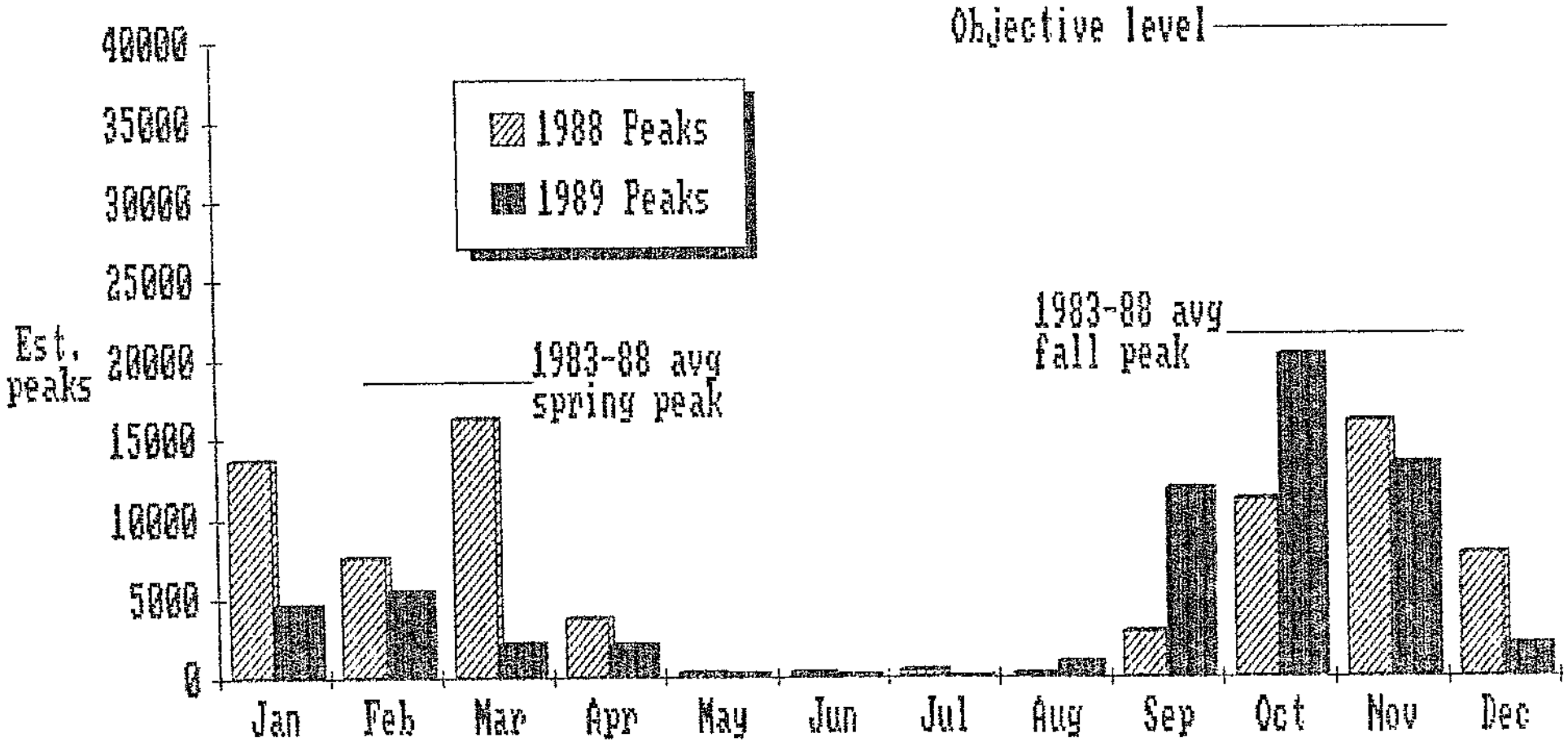
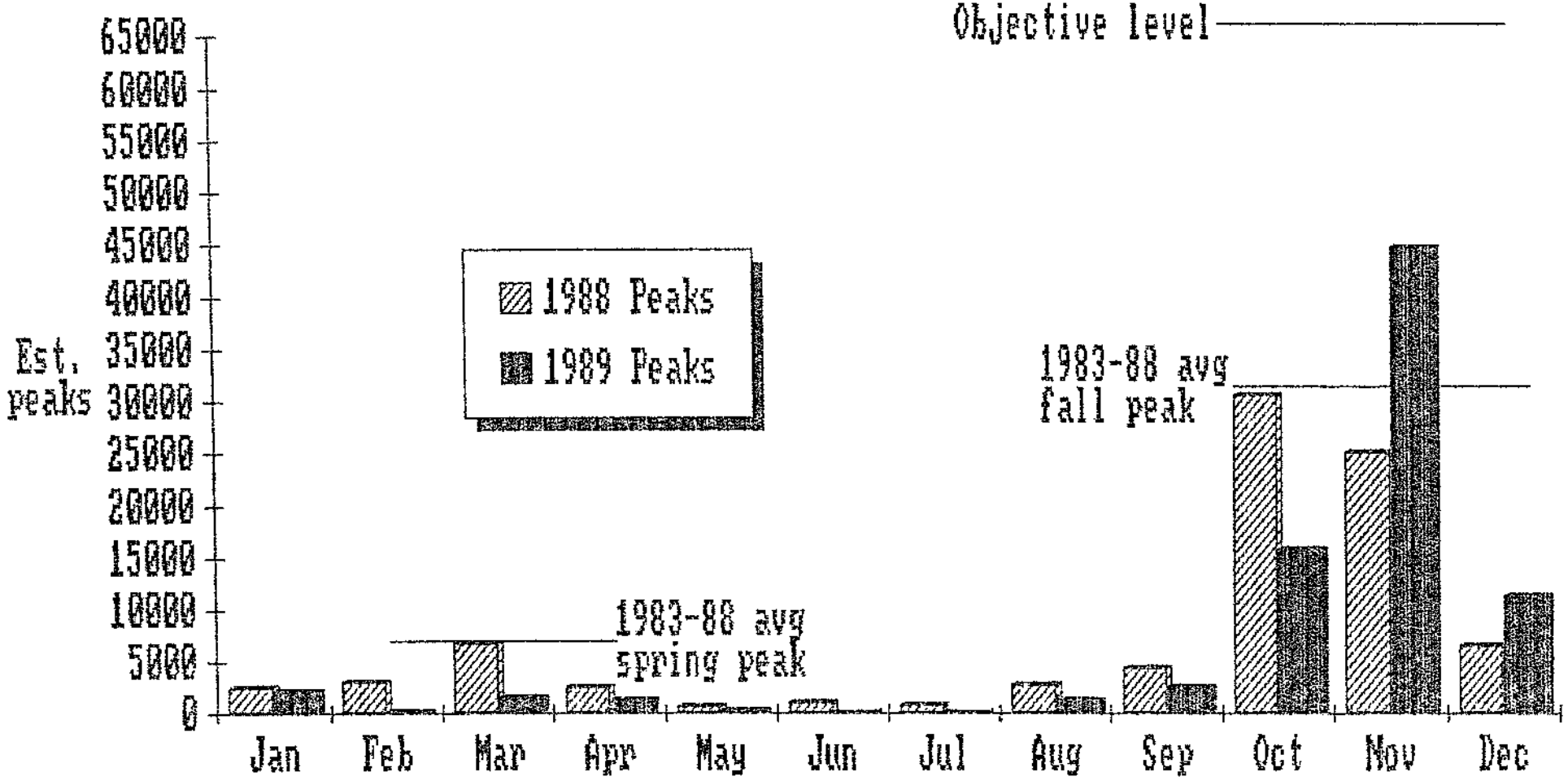


FIGURE G2. DUCK PEAKS IN 1988 AND 1989 COMPARED WITH AVERAGE SPRING AND FALL PEAKS, AND FALL OBJECTIVE LEVEL (FROM 1978 MASTER PLAN).



negligible. After many years without a program, twenty double-compartment wood duck boxes were erected by volunteers last winter. Although limited in 1989, use of these structures is expected to increase over the years.

Volunteer Gary Van Kirk adds nesting material to newly erected wood duck box (2/89, RW)

Estimates of the fall duck peak ranged between 35,000 and 45,000. Refuge staff generally agreed that the 1983-88 average was exceeded. Exceptional moist soil food production in Pool 1A may have been responsible. However, as in the case of geese, the fall objective level seems beyond reach (see graph). Again, objective levels, especially for ducks, may not be realistic for many of the same reasons already discussed. Intuitively, current habitat quality and quantity on Shiawassee probably limit fall duck use to levels experienced during the 1980's.

While most duck species are represented during the spring migration, relatively little diversity is observed in the fall. Typically, 90+ percent of flocks are comprised of mallards. Black ducks make up 5-10 percent in selected habitats. Green-winged teal may also be common in the fall, although total numbers rarely exceed 1,000.

c. Swans

About 150 swans were sighted on March 17th, increasing to an estimated 900 by the 23rd. County-wide, swans appeared in greater numbers this spring than in prior years. The fall swan peak was typical at around 100.

4. Marsh and Water Birds

July and early August saw impressive use by marsh and water birds, due in part to favorable habitat in the Moist Soil Unit 3 and 4/North Marsh area. Green-backed herons were present in greater numbers than the combined total of the previous two years. A least bittern, the first in years, was also observed. Great Blue Heron and Great Egret populations, primarily non-breeding, were generally consistent with 1988, with average weekly populations declining only 4 and 2 percent, respectively. Looking back over the past decade, breeding marsh and water bird populations and diversity have declined noticeably. Most conspicuous was the disappearance of a heron rookery in the early 1980's. Coots, both bitterns, and Virginia rails have also become scarce with little recent evidence of nesting. Recent drought, and/or the inability to retain water due to flood damage, are obvious problems that have reduced the carrying capacity of refuge wetlands. Region wide decline of some marsh species may certainly figure in as well. Fortunately, the potential for preserving and managing productive habitat remains. The increasing emphasis on America's wetlands, particularly recent farm bill initiatives, offers hope for the recovery of these species.

5. Shorebirds, Gulls, Terns and Allied Species

While Shiawassee may never host the great numbers which occur along North America's costal and central flyways, the refuge again provided a useful stopover point for shorebirds migrating through the region. Average weekly populations increased 14 percent this year over 1988, and overall use days were up 35 percent, with 21 species being represented. With a diversity of managed and unmanaged wetlands, there was always some suitable shorebird habitat available in 1989. Observations of species which only occasionally visit included ruddy turnstone, lesser golden plover, red-necked phalarope, and upland sandpiper. Numerous killdeer pairs, the only confirmed breeding shorebird, were again a welcome sight throughout the spring.

Young killdeer
on dike
(6/89, RW)

Due to the availability of open water on the Shiawassee River, herring gulls lingered until the end of January. Only five weeks later, the arrival of northward migrating gulls began. A notable first this year was the occurrence of a glaucous gull. Otherwise, gull use this year was consistent with expected populations and movements.

Migrating terns, though lower in density than 1988, increased in variety. Common and caspian terns (Michigan threatened species) were joined by black terns, reappearing after an absence of at least two years, and a pair of forster's terns, a species rarely observed on Shiawassee.

Combined spring and fall double-crested cormorant populations fell a surprising 87 percent below last year's total. Grebe observations were also very limited.

6. Raptors

The reappearance of wintering rough-legged hawks, after a virtual absence in 1988, indicated an increase in raptors that depend primarily on small rodents. An apparent abundance of meadow voles may have been a factor. No variations were noted in populations of accipiter species. Bald eagles represented the only raptor that declined, down 12 percent from 1988, due primarily to fewer non-breeding birds throughout the summer.

While the great-horned owl population appears to be stable, barred owl numbers probably declined in the 1980's. Sightings of this region's other owl species have been few and far between. An exception however, was the recent discovery of screech owls using at least two of the new wood duck boxes.

Raptor nesting in 1989 consisted of one pair of bald eagles (Section G.2), red-tailed hawks with one confirmed nest (production unknown), and great horned owls with one confirmed nest (two fledglings).

7. Other Migratory Birds

1989 marked the third and final year of songbird surveys to assess possible impacts of mosquito control on non-target species. Because of the volume and complexity, data was subsequently sent to the Regional Office to assist with analysis.

Songbird diversity was enhanced this spring by the presence of a Carolina Wren on the north side. This was the second recorded occurrence of this species.

8. Game Mammals

White-tailed deer on the State/Federal complex increased 42 percent, to just under 500 animals based on a February 24 aerial survey. Recruitment during the year probably raised the pre-season population to between 600 and 700. With a post-season goal of 500 to 600 deer, a more liberal harvest strategy was designed for the fall hunt (Section H.8). Questions about the herd's sex ratio prompted informal surveys, conducted primarily by volunteers, during late summer. To the surprise of "deer experts" these surveys indicated that a ratio of 4:1 (female: male) is in the ballpark. Refinements of this type that offer a better

understanding of deer population dynamics, and improved coordination/cooperation with area sportsmen have allowed more effective management of this popular game species.

White-tailed deer shown in "typical" summer habitat (6/89, RW)

Frequent flooding limits populations of other game mammals. However, somewhat drier conditions over the last 2 years have favored upland species, e.g. cottontail rabbits, while limiting aquatic furbearers. Muskrats probably numbered less than 250 at year's end. Although data is lacking, other furbearer populations appear limited.

Three young canids, "coyotes" at first glance, made a surprise appearance in 1989. Because coyotes are rare on Shiawassee, and the three behaved very tame, refuge staff suspected they were hybrids with a distinct domestic flavor. No adults were observed with the trio, and by late summer they disappeared permanently.

One of the three "coyotes" observed during the summer (9/89, RW)

10. Other Resident Wildlife

No significant changes were observed in resident songbirds common to this region. Upland species such as ring-necked pheasants may have increased moderately in response to drier conditions over the last 2 years. Most other resident wildlife, except as noted under Section G.9, remain at relatively low densities.

15. Animal Control

Bob Metevia, a local retiree who is very familiar with the refuge, again volunteered to assist with annual woodchuck control. An estimated 350 gas cartridges were deployed along dikes in 1989. While eradication of these destructive rodents is unlikely, diligent use of gas cartridges, combined with shooting and trapping where appropriate, offers the only hope of control.

16. Marking and Banding

Black duck trapping/banding in 1989 was curtailed due to the shortage of seasonal help. Handling and maintenance of traditional floating traps was not feasible. A further limitation was the absence of water in preferred black duck habitats, namely Pool 1A. To compensate, Assistant Manager Weide obtained rocket net materials from East Lansing Wildlife Assistance and the Michigan DNR.

Assistant Manager Weide prepares rocket net site (8/89, DP)

The first site, adjacent to a borrow pit in Farm Unit 1, yielded only green-winged teal and mallards, and was abandoned after a single shot. An island in the small pool just northwest of Pool 1A, a traditional loafing site for black ducks, was subsequently prepared and baited. Results of three additional rocket net shots are summarized in Table G.1 Five additional black ducks were recaptures.

A black duck in hand is worth... (9/89, RW)

Table G.1 Summary of 1989 black duck banding effort.

Date	AHY-M	AHY-F	HY-M	HY-F
9-14-89	10	3	1	---
9-22-89	4	2	---	1
9-28-89	1	---	---	1
Totals	15	5	1	2

Total banded again fell short of the goal of 200, last reached in 1984. Competition from other species, an apparent decline in the late summer population of black ducks, and the lack of stable water in key areas of Pool 1A continue to complicate capture of large numbers of black ducks. While use of a rocket net required fewer man-hours and prevented predator losses, it was not the hoped for answer to banding black ducks on Shiawassee. Perhaps a combination of techniques, assuming a more favorable habitat and personnel picture, can be used in 1990 to meet the station banding goal.

Canada geese constantly interfered with attempts to capture black
EM)

17. Disease Prevention and Control

On January 6th, about 25 ducks and geese along small openings in t
River were observed in apparent weakened condition. Their abnorr
particularly head movements, led some staff to suspect avian c
National Wildlife Health lab (NWHL) was notified immediately, and ni
(seven ducks and two geese) were picked up for diagnosis. An e
affected birds, most well out of reach, were noted on January
additional mallards were picked up for shipment to the NWHL. Swift
hazardous thin ice over many areas hampered efforts to keep the sit
only 9 geese and 18 mallards were retrieved for disposal on Ja
Finally, on January 11th, a call from Madison confirmed lead poisoni
and low water in 1988 may have allowed birds to pick up lead shot i
that were formally inundated. Estimated total mortality may have
birds.

H. PUBLIC USE

1. General

Overall refuge visitation was estimated to be up 14 percent over th
(Table H1.). With the exception of May and June when portions of the
flooded, the relatively moderate weather in 1989 may have encoura
trail use. An increased level of recorded use during fall month
additional hunter opportunity this year. Traffic counters and staf
have taken some of the guesswork out of public use estimates since 1
visitation trends for the period 1979-89 are shown in Figure H1.

FIGURE H1. TOTAL REFUGE VISITATION, 1979-89 (rounded to nearest thousand).

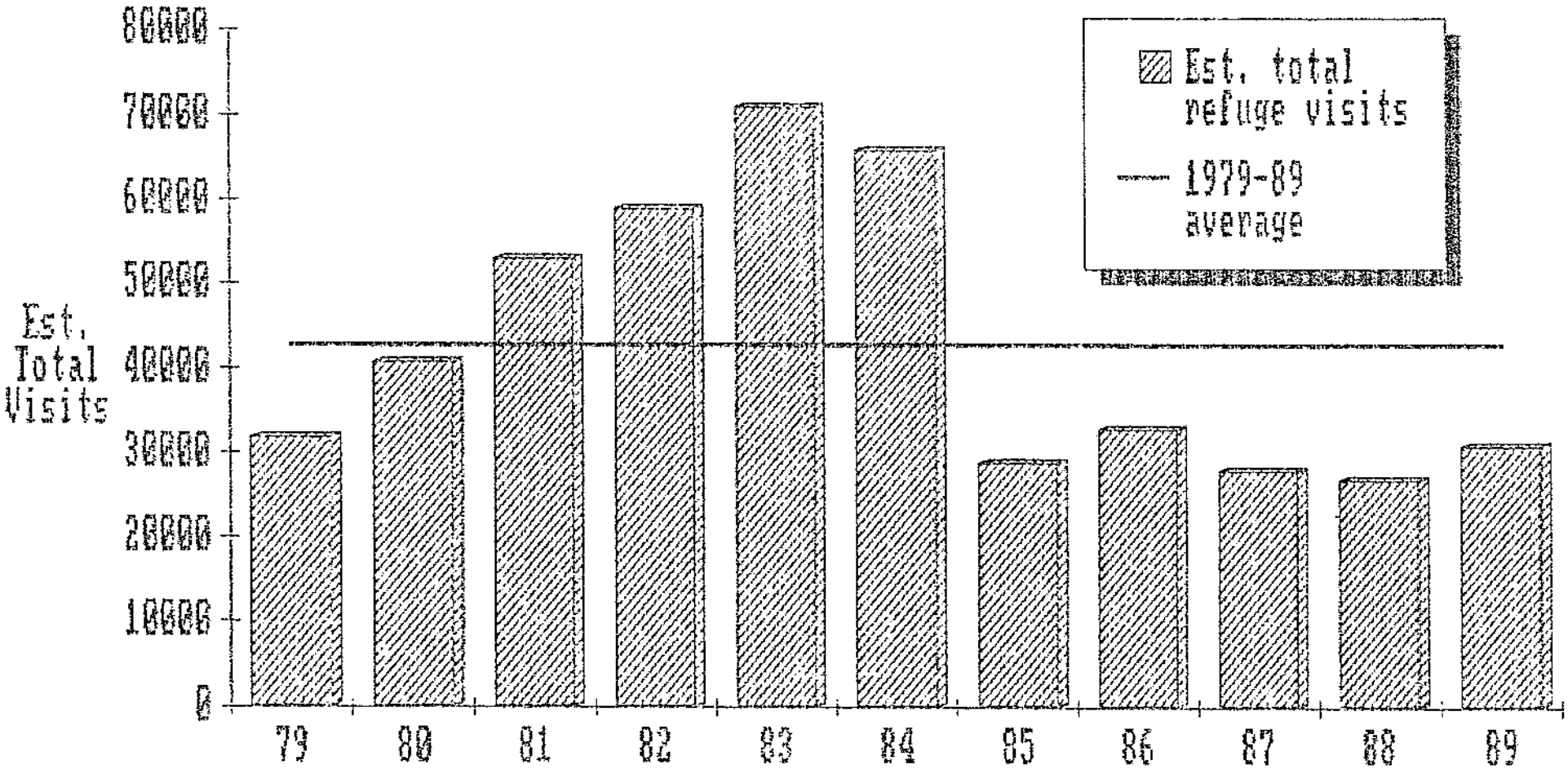


Table H1. Estimated monthly and total visits in 1989 compared to 1988.

Month	1988	1989	Percent change
January	928	1,154	+ 24
February	900	860	- 4
March	1,373	2,050	+ 49
April	1,875	2,227	+ 19
May	7,062	6,004	- 15
June	3,318	2,238	- 33
July	1,280	2,095	+ 64
August	1,278	2,565	+101
September	1,585	2,816	+ 78
October	4,620	5,158	+ 12
November	1,809	2,199	+ 22
December	1,308	1,769	+ 35
	27,336	31,135	+ 14

3. Outdoor Classrooms - Teachers

Loss of the station's Outdoor Recreation Planner position in the early eighties, and added responsibilities under the private lands initiative, have all but eliminated our ability to accomplish environmental education goals. This is unfortunate because urban centers near the refuge offer tremendous potential. Despite constraints, one significant effort was made with regard to providing support for local area educators. On November 4th, Assistant Managers Merritt and Weide participated as instructors in an environmental education workshop, offered for University credit, at Hartley Outdoor Education Center in St. Charles. Our half-day seminar, entitled Wetlands Awareness and Sensitivity, was attended by fifteen teachers.

Through role playing and interaction with the computer, workshop enrollees gained an understanding of wetland issues and associated conflicts (11/89, RW)

Through the use of audio visuals, microcomputer simulations, and outdoor sensory awareness activities, the following objectives were pursued:

1. To provide an understanding of wetland losses and the importance of the wetland resource to wildlife and people.
2. To enhance the ability to plan and implement environmental education activities in the wetland environment.
3. To demonstrate the use of microcomputers and sensory awareness activities in environmental education.
4. To increase knowledge of the National Wildlife Refuge System and how refuges can support environmental education activities.

The "blind leading the blind" enroute to sensory awareness activity site (11/89, RW)

Feedback from local area educators enrolled in the seminar was very positive. We estimate that our efforts generated approximately 60 teacher activity hours and 900 student activity hours of environmental education activities focusing on wetlands. Approximately 40 hours of staff time were required.

Participants sharpen non-visual skill through exploration along a blindfold trail (11/89, RW)

7. Other Interpretive Programs

Structured environmental/wildlife education provided by non-Service personnel in 1989 is shown in Table H2. Non-structured interpretive tours/programs provided by Service personnel, area educators, and refuge volunteers are listed in Table H3. Off-refuge programs are listed in Table H4.

Table H2. Structured environmental/wildlife education conducted by non-Service personnel in 1989.

Date	School/group	Attendance
5-17-89	New Lothrop Elementary	32
9-27-89	New Lothrop Elementary	27
10-24-89	St. Lorenz, Frankenmuth	63

Table H3. Non-structured tours/programs provided by Service personnel, area educators, and refuge volunteers in 1989.

Date	School/group	Attendance
4-7-89	Hamady Middle School, Flint	90
4-10-89	Saginaw Valley College, Ornithology Class	7
5-10-89	Chesaning High School, Conservation Class	63
5-12-89	Bridgeport Baptist Academy	275
5-19-89	Hamady Middle School, Flint	92
7-18-89	Saginaw 4-H	13
10-6-89	Michigan State University, Wetlands Class	13
10-14-89	Chippewa Nature Center	15
10-24-89	Frankenmuth Elementary	20
10-25-89	Saginaw Field and Stream	6
10-26-89	Central Michigan University, Wildlife Class	20

Table H4. Off-refuge programs/appearances by refuge staff in 1989.

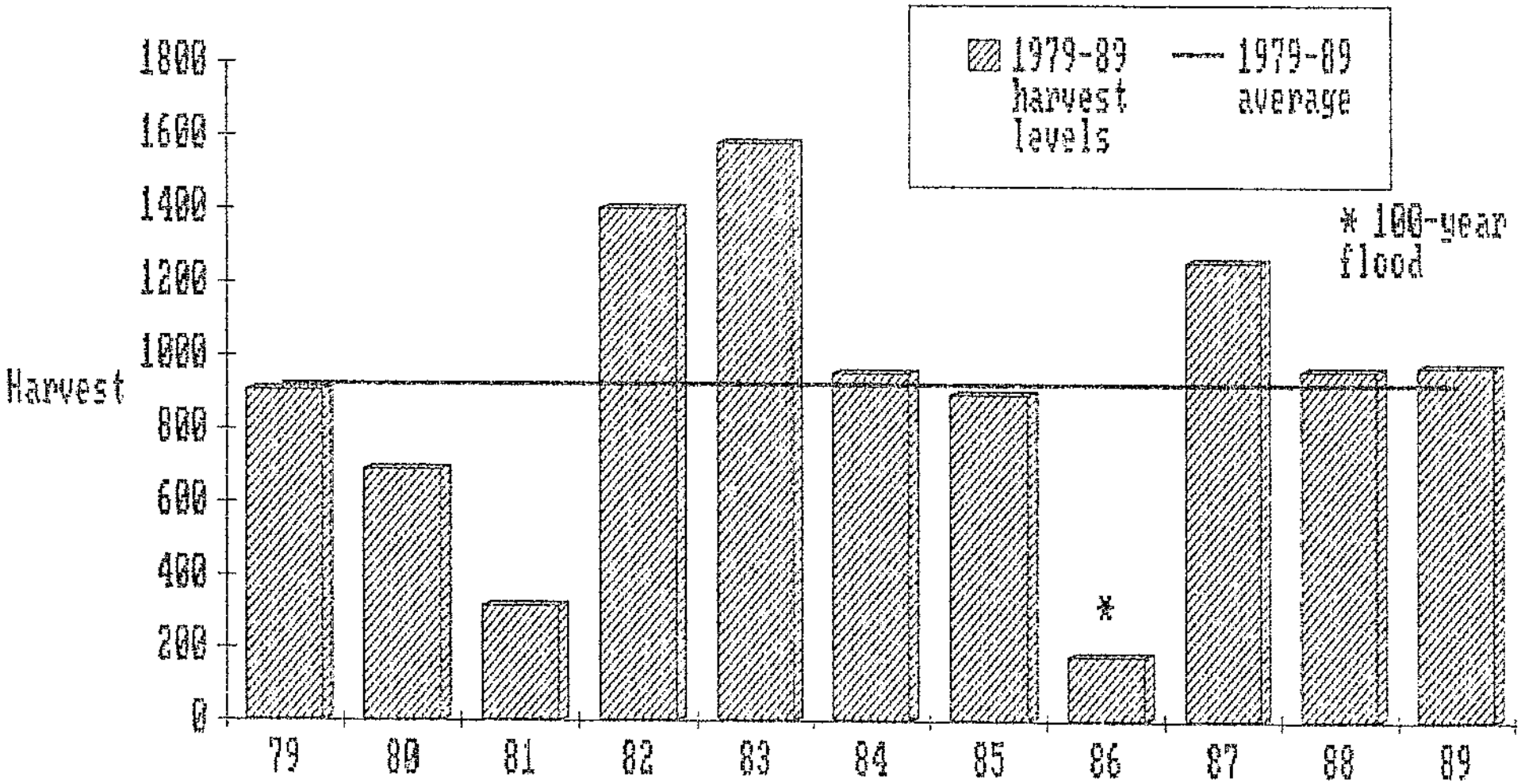
Date	Group/Activity	Attendance
9-23-89	Saginaw Field/Stream Club, National Hunting/Fishing Day	100+
9-25-89	YMCA Retired Men's Club	35
11-9-89	Saginaw Field and Stream Club	250
12-12-89	Shiawassee Flats Citizens & Hunters Association	25

8. Hunting

a. Waterfowl

Total harvest from the managed goose hunt was similar to 1988, and just above the 1979-89 average (Table H5 and Figure H2). Based on 1,628 hunter visits, average success was 67 percent, compared to 57 in 1988. Increased numbers of geese were present this year taking advantage of relatively abundant food, primarily waste grains, on and off the refuge. In addition, inclement weather late in the season probably favored hunter success. This was reflected throughout Saginaw County as the Goose Management Area quota was reached this year on November 12th, pre-empting the scheduled second part of the season from November 24th to the 26th.

FIGURE H2. SHIAWASSEE NWR MANAGED GOOSE HUNT HARVEST TRENDS, 1979-89 (excludes state managed pool 4 hunt).



Two young "blue geese" were brought down this year -- unusual for Shiawassee (10/89, RW)

Table H5. Shiawassee NWR Managed Goose Hunt Data, 1978-1988.

Year	No. Hunting Days	Hunter Visits	Refuge Harvest	Management Area Quota	Quota Reached
1978	28	1,576	415	2,500	No
1979	16	1,532	909	2,500	Oct. 31
1980	28	1,991	692	3,000	No
1981	27	1,410	319	3,000	No
*1982	16	1,444	1,409	3,000	Oct. 17
*1983	31	2,120	1,587	5,000	No
1984	21	1,603	959	5,000	No
*1985	23	1,719	901	5,000	No
1986	14	349	184	5,000	No
*1987	23	1,764	1,263	4,500	Yes
*1988	23	1,698	965	4,500	No
*1989	23	1,628	977	4,500	Nov. 12

*Daily Bag limit 2; all other years daily bag limit 1

Traditionally, many of the pre-hunt administrative functions have been handled by the Michigan Department of Natural Resources. Goose hunt applications were again processed and permits drawn in Lansing; a $3.00 fee is required from each applicant to defray expenses. The State provides a printout of hunters issued permits for the reserved Federal hunts. Refuge specific information was incorporated into the Michigan Waterfowl Hunting Guide.

The managed hunt on the Federal Refuge again ran 23 consecutive days, but began this year on September 30th. Because of demand early in the season, reserved permits, drawn by the State (see above), are required during the first 2 weeks. Because traditionally hunter interest diminishes as success declines later in the season, the third and final week of the refuge season is managed using an open draw system.

The hunt is intensively managed with an orientation and drawing for choice of blind at 5:30 a.m., and mandatory check-in by 1:00 p.m. Construction of a new flood control dike across hunting units resulted in elimination of two field blinds, leaving a total of 33 this year. All blinds are in standing corn adjacent to a lure crop, usually winter wheat. A maximum of three persons per blind is allowed. In addition, up to eight parties are allowed access to the Shiawassee River in a "scramble type" goose hunt. The total goose bag was increased to seven this year; however, the Canada goose component remained at two.

One of the smaller of the handful of Richardson's geese harvested in 1989 (10/89, RW)

Traditionally, the Federal refuge has been hunted only in the morning, and for only part of the season set by the State. Reasons include the increased cost of staffing the check station, particularly after hunter success and interest decline later in the season, the increased risk of exceeding the management area quota, and decreased opportunity for non-consumptive use of the trail system. Sanctuary provided by the refuge when other areas continue to hunt intensively has also been considered.

The second weekend was again reserved for youth hunters. Up to two youth between 12 and 17 years of age are permitted in each blind. An adult supervisor, who may not hunt, must accompany each party. For the third consecutive year hunter turnout increased, with 41 and 35 youth hunters participating on the first and second days, respectively. Hunter success also increased this year to 46 percent, compared with 30 percent in 1988. The popularity of the Shiawassee Youth Hunt, with its focus on "quality", has apparently increased throughout lower Michigan.

Successful youth hunters! (10/89, RW)

An estimated 440 acres, comprising Pool 4 and adjacent wetlands, is managed by the State for waterfowl hunting under a cooperative agreement. Close proximity to the Shiawassee State Game Area and the area's relative inaccessibility from the remainder of the Federal Refuge without a boat led to this agreement. A reported 321 geese and 694 geese were harvested this year, in contrast to 1988 levels of 137 and 250 respectively. Temporary dike repairs to Pool 4 (see E.4 and F.2a) led to improved habitat conditions, favoring waterfowl hunters this year.

Shiawassee again cooperated in a State study to assess the proportion of giant Canada geese in the harvest. Age, sex, culmen length, and number of immature tail feathers were recorded for a sample of 100 Canada geese taken during the managed hunt. While the analysis of 1989 data has not been forthcoming, typically giants comprise about 20 percent of the refuge harvest.

b. White-tailed Deer

Cooperation with the State and Shiawassee Flats Citizens and Hunters Association regarding management of the area deer herd reached new heights in 1989. An antlerless harvest, previously unmentionable, was agreed to with few reservations this year. A goal of 150 antlerless deer, split evenly between the State and Federal areas, was established. To achieve the Federal contribution 96 antlerless muzzleloader permits, for a special November season, and 610 either sex, late season archery permits were issued. State area hunt options/seasons were more liberal. Concerns by area sportsmen regarding overharvest and quality have traditionally led to more restrictive deer hunting on the Federal refuge.

The main reason for the popularity of Shiawassee deer hunts (9/88, donated by Roy Felix)

An unusually complex application included all State and Federal hunt options. Federal area muzzleloaders could select from three 2-day hunt periods, while Federal archers had their choice of four 7-day hunts. Computer processing was, for the most part, handled by the State, although Administrative Technician Titcombe assisted generously with data entry and program "fine-tuning".

Self-addressed, stamped survey cards were again included with all permits to allow later evaluation of the hunt. While some reminders were necessary, an impressive 93 percent of permit holders responded. Table H6 summarizes 1989 deer hunt data.

Table H6. Shiawassee NWR 1989 deer hunt summary.

Hunt	Number Hunters	Reported Harvest Bucks	Does	Total	Percent Success	Total Visits	Total Hours
Muzzleloader	78	10(fawns)	29	39	50	114	695
Archery	459	42	35	77	17	1,685	10,947
Totals	537	52	64	116	22	1,799	11,642

The total harvest exceeded expectations this year. Suspected reasons include a lower than normal "no-show" rate and somewhat higher success rate among late season archers. This contrasted sharply with 1988. It is becoming increasingly obvious that the assorted variables associated with management of the Shiawassee deer herd will continue to frustrate efforts to "fine-tune" the fall hunt.

9. Fishing

Area fisheries continue to be dominated by rough fish, particularly carp. The highly touted walleye fishery developed in the Tittabawassee during the early 1980's appeared to wane in 1989. Low water in area rivers as fish were preparing to move from Saginaw Bay to spawning sites may have been a factor. Despite continued rearing/stocking efforts by the DNR and area sportsmen, including rearing ponds on the adjacent State Game Area, it is unlikely that any semblance of the historical fisheries will be restored until fundamental changes in water quality take place. Public health advisories, warning against consumption of fish from major river systems that intersect the refuge, remain in effect.

Catfish taken from Flint River near refuge boundary (8/89, RW)

10. Trapping

Only two parties submitted bids, and ultimately trapped the refuge in 1989. Two units were allowed per party. Trapping effort and harvest were down 40 and 10 percent, respectively, from 1988. Continued low water, limiting muskrat production and survival, and low pelt prices were chiefly responsible. Table H7 summarizes the 1989-90 trapping season.

Table H7. Trapping program summary, 1989-90 season.

	Ditches/ Pool 4	Evon Road/ River Marshes	Totals
Muskrat	309	133	442
Raccoon	---	12	12
Beaver	---	5	5
Fox	---	1	1
Mink	---	1	1
Total Hours	116	119	235
High Bids	$770	$165	$935

11. Wildlife Observation

The total 31,135 refuge visits reported in H1 included 21,512 hiking trail visits. General use of the trail system, unless for specific interpretive or hunter use, often includes wildlife observation. Spring and fall migrations are most popular.

17. Law Enforcement

Law enforcement problems were minimal in 1989. Efforts increased significantly with regard to cooperation with Michigan Department of Natural Resources law enforcement personnel, and FWS Special Agents. A brief review of law enforcement related events follows:

1. February 27th - March 3rd: Refuge Officers Prusa, Merritt, and Weide attended the 40 hour Annual Law Enforcement Refresher Course at Fort McCoy, Wisconsin.
2. May 3rd: Refuge Officers Prusa and Merritt attended a coordination meeting with Saginaw County Sheriff Jim Kelly to discuss topics of mutual concern.
3. October 3rd: John Lindell (Rice Lake NWR) and Jim Pearson (Minnesota Valley NWR) conducted firearms qualifications for Shiawassee, Seney, and Ottawa personnel. Firing range facilities were provided by the Saginaw Field and Stream Club.
4. October 3rd - November 1st: Shiawassee personnel had use of an airboat borrowed from Ottawa NWR which increased patrol capability on both State and Federal public hunting areas.

5. October 14th - 15th: Refuge Officer Merritt assisted Michigan and Ohio Special Agents in a law enforcement detail which focused on private duck clubs and state game areas on Saginaw Bay.
6. November 29th: Refuge Manager contacted Gordon Hauglie, General Supervisor for Land Management, Consumers Power Company, to discuss a problem associated with deer hunting permits being issued for power line property traversing the refuge. A willingness on the part of Consumers Power to resolve the problem was evident.

As in previous years, law enforcement efforts were concentrated during the migratory bird and deer hunting seasons. Non-hunting related problems, with the exception of continual vandalism and trash dumping, are minimal due to a lack of public access. There is no auto tour route on Shiawassee and no public roads traverse the refuge. At times, it is expedient and/or advantageous to refer cases to our local State Conservation Officers. Table H8 summarizes Federal cases and those referred to the State.

Table H8. Summary of law enforcement cases in 1989.

Violation	No. of Cases	Disposition
Trespass	3	Pending
Unplugged gun	1	Pending
Lead Shot	1	Pending
No Duck Stamp	1	Pending
Failure to Comply with Special Hunting Regulations	4	2 - Pending 2 - $50.00 fine

Vandalism or art? Our gates continue to take their toll on privately owned vehicles (10/89, RW)

Managed youth hunt provides an opportunity to help start them off right (10/89, RW)

Referred to State:

Violation	No. of Cases	Disposition
Invalid Fishing License	1	$35.00 fine
Hunting on Closed Area	1	$75.00 fine
Animal Trespass	1	$35.00 fine
Shining Deer with Loaded Firearms in Vehicle	2	$415.00 fine/1 year loss of hunting privileges/1 night in jail/firearms and vehicle seized

In addition to the cases listed in Table H8, State Conservation Officers cited 16 individuals for various waterfowl hunting violations on the adjacent State Game Area. The Saginaw Bay detail on opening day of duck season was disappointing due to "bluebird" weather. The objective was to write as many overbag cases as possible on private duck clubs, but the birds did not fly. Citations were issued for duck stamp, lead shot, and unplugged gun violations. Despite the weather not cooperating, the exercise was valuable. It provided an opportunity for Agents, Refuge Officers, and State Conservation Officers to work together, and show the public we care.

The use of Ottawa's airboat provided an opportunity to check hunters in areas largely inaccessible during low water conditions (10/89, RW)

Refuge Officer Weide checking hunters on the Shiawassee River (10/89, EM)

I. EQUIPMENT AND FACILITIES

1. New Construction

Several major construction projects, associated with both flood control and habitat development, required considerable staff involvement and resulted in significant progress toward meeting objectives. They are as follows:

a. Flint River Erosion Control Project

Flood control is one of the purposes for which the refuge was established. The Flint River Dike and Erosion Control Project, which is essentially a flood control project for the lower reaches of the Flint River, began encroaching on the refuge this year. An offset dike, known as Phase I, progressed into the refuge from the south boundary about .5 mile. Completion of Phase I was accomplished by September 30th, including mitigation in the form of nesting cover, and construction of small wetlands and brushpiles. Preparation of required NEPA documentation and support for issuance of a right-of-way permit to accommodate this work required considerable staff time in late winter and early spring. Final design, route, and even funding for Phase II of the project remained in question at year's end.

Construction activities during Phase I of the Flint River Erosion Control Project. (8/89, RW)

b. Moist Soil Units 3 and 4 Development

Severe weather forced a shut-down of construction activities at the pump station site in early January. Work commenced on May 2nd then progressed rapidly as follows:

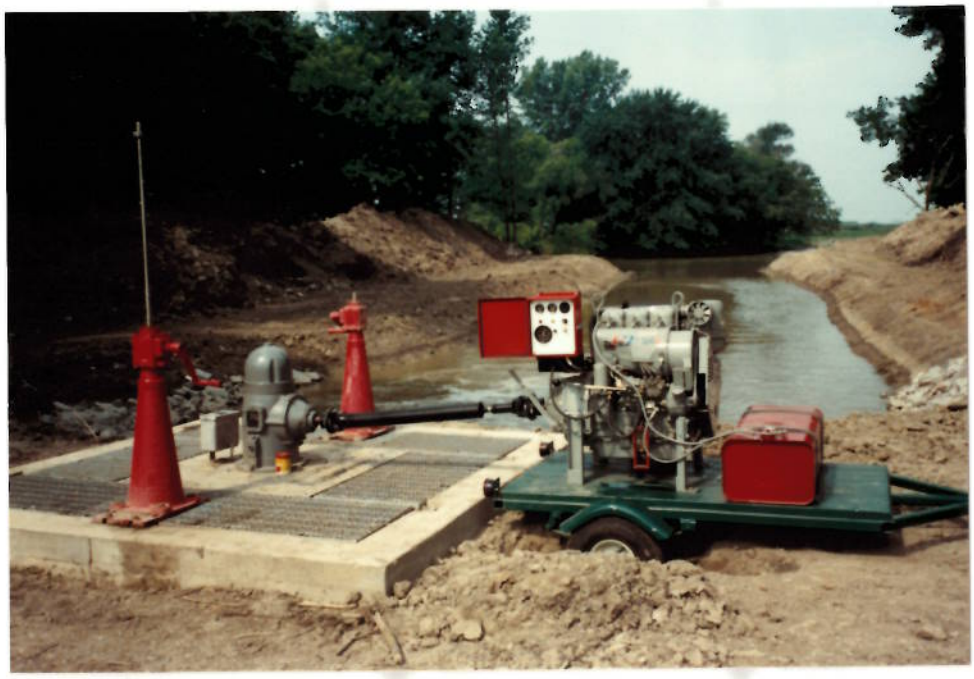
1. Inlet canal cleaned out from pump station to Spaulding Drain, July 18th.
2. Gates, valves, and pump head installed and operational, August 2nd.
3. Hydroseeding of disturbed areas, August 2nd.
4. Power unit delivered and operational, August 25th.

Cleaning out inlet canal from Spaulding Drain to pump station; pumphead and gates in place (7/89, EM)

Moist soil units remained less than fully operational at year's end due to additional dike and water control structure requirements. However, completion of the pump station facilitated limited water manipulation in support of the fall waterfowl migration.

Checking final levels of main inlet tubes: loading ditch in background. (5/89, EM)

Additional work in support of the Moist Soil Unit 3 and 4 development was accomplished force account. Approximately 1,000 feet of Evon Road from the pump station west was raised an average of 18 inches to improve access and increase water storage in the loading ditch.



Completed pump station with attached power plant (8/89, EM)

c. Public Use Facilities

Visitor facilities were upgraded significantly with the construction of two new interpretive/informational kiosks. Located at nature trail access points, currently each kiosk includes a map and regulations. Both kiosks were fabricated force account by maintenance workers Blazo and Nowosatko, and installation was completed by early May.

Maintenance workers Blazo and Nowosatko erecting new interpretive kiosk at Curtis Road trailhead. (5/89, EM)

New interpretive kiosk at Stroebel Road trailhead (5/89, EM)

2. Rehabilitation

a. Pools 1A and 1B

Contract work for major rehabilitation of Pools 1A and 1B, funded through a special flood damage appropriation, continued in 1989. Two contracts, one for spillway and water control structures and a second for the exterior dike, were initiated in 1988. The spillway/water control structure contract was awarded to Champaign and Marx Excavating, Bay City, Michigan. Work began in 1988, carried over into 1989, and was suspended in mid-January due to severe weather. Efforts resumed in late winter, and water control structure work, consisting of replacing two screwgate units, was completed on March 3rd. Spillway work resumed on May 8th, and was completed May 18th.

Unfortunately, the Service was unsuccessful in securing a contract for rehabilitation of the Pool 1A/1B exterior dike. The contract, which was earmarked for minority owned businesses, was negotiated with a Detroit area firm. However, cost estimates by the firm were exorbitant and unacceptable. Further complications included an access problem for heavy equipment and materials due to weight restrictions on a county bridge scheduled for replacement next year. As a result, a new contract will be awarded, and hopefully, work on the exterior dike will be completed in 1990.

New screwgates installed by Champaign and Marx Excavating. (3/89, EM)

Riprap placement over filter cloth on Pool 1A/1B crossdike. (5/89, EM)

b. Moist Soil Unit 1 and 2 Crossdike

Continual deterioration of the crossdike between Moist Soil Units 1 and 2 resulted in major rehabilitation. To minimize cost and interference with water management, the work was accomplished force account after a scheduled drawdown. Backhoe work began in late June and consisted of piling material to facilitate drying to a workable moisture content. The D4-E bulldozer then layered, compacted, and shaped the dike and side slopes to grade. Seeding and mulching was handled by Michigan Youth Corps enrollees and volunteer Peters. By August 25th grass was beginning to emerge, and some cover benefits were realized prior to fall precipitation.

Refuge volunteer David Peters uses Honda to put final touches on seedbed prior to mulching Moist Soil Unit 1 and 2 crossdike. (7/89, RW)

Canada geese were attracted to emerging grass cover: Note: buckwheat crop on MSU-2 at left. (8/89, RW)

3. Major Maintenance

Due to a lack of funds and personnel, numerous important maintenance items were not attempted or were delayed. Nevertheless, progress in several areas occurred and is listed as follows:

1. On February 17th, the refuge residence required installation of a new furnace and additional heating ducts at a cost of $1,700.

2. Progress continued in cleaning up the old refuge "boneyard" throughout winter, and the job was approximately 80 percent complete by spring.

3. Resetting utility poles which support electrical service to the Moist Soil Unit 1 pump station seems to be an annual chore. Consumers Power Company accomplished the task this year in July. Refuge Manager Prusa has been working closely with Company representatives to resolve the continuing maintenance and strike hazard problem.

4. Several miles of refuge boundary fences were removed and replaced with new boundary signs. The fencing was both unnecessary and in poor condition. In addition, brush clearing and trail surface maintenance along the 4.5 mile Stroebel Road Nature Trail was completed. Both items were a result of labor provided by the Michigan Youth Corps program.

4. Equipment Utilization and Replacement

The aging vehicle fleet continues to be a point of concern. One new vehicle was finally delivered in February. Maintenance worker Blazo was more than happy to transfer his tools into the new Dodge 1/2 ton pickup. In July, an older Chevrolet Luv pickup was transferred to Wildlife Assistance, East Lansing, for use by seasonal personnel involved in the Kirtland's Warbler Project and other activities.

As a result of both Farm Bill and on-station work, heavy equipment utilization continued at a frantic pace throughout the year. A total rehabilitation of the heavy equipment transport trailer was completed by winter's end. This was necessary prior to hauling equipment off station. The radiator on the John Deere grader was replaced in August at a cost of approximately $1,000. Cylinder head work on the D4-E bulldozer, totalling $1,200, was paid for with Farm Bill funds provided by the Regional Office.

5. Communications System

During the year, one of the AT&T Merlin telephones needed to be replaced under the maintenance/repair contract. The mobile radio that was in the 1979 Chevrolet pick-up was taken out and installed in the 1989 Dodge pick-up. Also, the base station began to make "strange" noises and had to be repaired.

6. Computers

The computer era caught up with the refuge this year. In January, all computer equipment was moved to the front office to allow optimum use. In February, newly hired Administrative Technician Titcombe began utilizing the computer with the typing of the 1988 narrative; a first for this station. In March, Administrative Technician Titcombe attended a computer orientation seminar at the Regional Office.

The maintenance contract proved useful when the IBM Wheelprinter needed to be replaced three times in two months. The Hayes Smartmodem was also repaired in September. Janice Whitney, computer specialist from the Regional Office, visited the station for three days in May. After reinstalling all software onto the hard disk due to a system/software malfunction, Janice provided hands-on training to Administrative Technician Titcombe. Once all systems were go, Shiawassee finally became "computerized".

WordPerfect was used on a daily basis for virtually all correspondence and reports. RBase software was used for accounting, property inventory and mailing labels. Chart was used for graphics in management plans, and in August we received the 3.0 upgrade which significantly enhanced station graphic capabilities. Telecommunications enlightened station personnel to the world of electronic mail.

Janice Whitney correcting computer malfunction (5/89, KT)

In cooperation with the Michigan Department of Natural Resources, an attempt was made to computerize the 1989 deer hunt application and permit selection process. As is often the case on an initial attempt, numerous problems complicated this "easier" method of managing the hunt. After many long hours, the problems were temporarily resolved and the selections were successfully completed.

A new program, FormFiller, was purchased in July with funds from the Regional Office. At year's end, the program which is for use on pre-printed forms, was still under review.

J. OTHER ITEMS

1. Cooperative Programs

Cooperation between the Michigan Department of Natural Resources and the refuge continued in 1989. The State handled the managed goose hunt application process and sent us a list of the successful hunters. We collected morphological data from the harvested geese. This year the Shiawassee State Game Area was to process all the applications for the managed deer hunt. Because of some problems with the computer program, Administrative Technician Titcombe spent over 160 hours on entering deer hunt applications. Hopefully this process can be streamlined for 1990.

The agreement permitting the State Game Area to manage the waterfowl hunting in Pool 4 remained in effect. An agreement between the Service and the Saginaw County Mosquito Abatement Commission provides for treatment of up to 1,000 acres of the refuge adjacent to the City of Saginaw with a biological larvicide. In accordance with an Environmental Assessment written in 1986, the impact of

treatments on non-target species would be monitored over a 3 year period. While the Mosquito Commission sampled invertebrate populations, refuge personnel and volunteers surveyed avian populations in treated versus untreated study areas. This was the final year of the 3-year monitoring effort. All the data was sent to the Division Biologist for analysis.

4. Credits

The particular sections of the narrative were written by the following:

Assistant Manager Merritt - Sections F-2.b,4; H-3,17; I-1,2,3,4; M-1

Assistant Manager Weide - Sections B; E-2,4,6; F (except 2.b and 4); G-1,3,8,10,~~11~~,15,16,17; H (except 3 and 17)

Administrative Technician Titcombe - Section I-6

Volunteer David Peters - Sections G-2,4,5,6,7

Refuge Manager Prusa - Sections C-3; D-2,4,5; E-1,5,7,8; I-5; J-1; M-2

The report was edited by Refuge Manager Prusa and was typed and assembled by Administrative Technician Titcombe.

M. WILDERNESS AND SPECIAL AREAS ADMINISTERED BY SHIAWASSEE

1. Michigan Islands NWR

The Michigan Islands NWR was established by Executive Order 9334 in 1943 as a refuge and breeding ground for migratory birds and other wildlife. These three islands; Shoe and Pismire in Lake Michigan and Scarecrow in Lake Huron are 2, 3, and 7 acres in size, respectively, and are similar in character. In 1965 a fourth island, Thunder Bay, was added to the refuge by the U.S. Coast Guard under a revocable permit, with 5-year renewal periods. Renewal of the permit was accomplished in 1985. The Service has secondary jurisdiction on 121 acres of the total 168 acres at Thunder Bay Island. Gull Island (230 acres) became the fifth island in the system in 1969 when it was ceded to the Service by the U.S. Coast Guard. The three original islands in the Michigan Islands NWR were designated as Wilderness Areas in 1970 under Public law 91-504, Stat. 1104.

Manager Prusa inspects "ship-wreck on Thunder Bay Island (6/89, EM)

On June 7th, Refuge Managers Prusa and Merritt visited two Michigan Islands NWR units: Thunder Bay and Scarecrow Islands. Also present were Tim Kubiak and Dave Best, Ecological Services Biologists, East Lansing. The assistance of Ecological Services was appreciated as Shiawassee NWR does not own a boat suitable for "big" water. A general inspection of the islands did not result in any indication of trespass, public use, or boundary sign problems. The islands are used heavily by migrating and nesting birds. Notable nesting species include gulls, terns, cormorants, herons, and limited waterfowl. Increasing lake levels during most of this decade have inundated some land areas.

Cormorant nests on Scarecrow Island (6/89, EM)

2. Wyandotte NWR

Wyandotte NWR was established by Congress in 1961...."to be maintained as a refuge and breeding place for migratory birds and other wildlife". However, "breeding place" in the authorizing document has little application since production potential is very limited. The refuge is located in the Detroit River just off shore from the cities of Wyandotte and Ecorse, and consists of two small islands, Grassy and Mamajuda, and their surrounding shoals approximately to the six-foot contour depth. Total size is approximately 304 acres. Grassy Island has been used as a confined disposal facility for contaminated dredge spoil since the late 1950's. Mamajuda Island has long had less than one acre above the waterline. Within the last ten years high water levels and erosion have resulted in only an occasional boulder or concrete slab and a metal navigational aid structure above water.

The refuge was historically important as one of the most significant staging areas for diving ducks in the United States. Extensive beds of wildcelery and associated submerged vegetation attracted large concentrations of divers, particularly canvasback and scaup. However, over the last 100 years, industrial discharges, municipal sewage effluent, urban runoff, and combined sewer overflows have degraded the Detroit River ecosystem. Dredging, disposal of dredged material, and the operation of large and deep-draft vessels have further eroded fish and wildlife values.

To date, management of Wyandotte has focused primarily on restricting dredged spoil deposition to the Grassy Island site to protect important celery beds. In addition, prior to 1982, a closed area was established each year along shoals adjacent to Grassy and Mamajuda Islands to provide sanctuary during the waterfowl season. This practice was discontinued, however, due to declining waterfowl use of the area and the high cost of transport, set-up, and removal of buoys by Shiawassee NWR personnel based approximately 100 miles away.

Boundary posting of the Grassy Island uplands is inspected and maintained on an annual basis. Reposting was last accomplished in 1986. Law enforcement, however, is difficult in light of the distance from Shiawassee. Michigan Conservation Officers assist by providing occasional patrol of the area.

In late 1987, the Corps of Engineers requested that their right to use Grassy Island as a confined disposal facility be relinquished. Because there were many questions as to the amount of contamination of the dredged spoil and the continuing analysis of samples taken by the East Lansing Ecological Services Office, the request was denied. It was felt that the Corps has some liability focusing on the long-term maintenance of the site.

On May 10th Refuge Managers Prusa and Merritt met with Regional office Biologist Hutchinson and Ecological Services Biologists Kolar and Kubiak at Wyandotte. A tour of Grassy Island to familiarize everyone with the activities of the Corps of Engineers was the order of business in the morning. The afternoon was spent meeting with the COE in their Detroit office discussing what needed to be done to Grassy Island before their Confined Disposal Facility permit was terminated.

In late November, through a personal conversation with Ecological Services Project Leader Pacific, it was learned that the Corps began to fill in the pond at the north end of Grassy Island. Also, in 1963, 200 5-gallon containers of mineral spirits were buried on the island. The Corps was to go in, try to locate, and remove the containers.

The pond on the North end was drained but not filled and because of conditions on the river the magnetic survey to locate the containers of mineral spirits was not accomplished.

Wildlife Associate Manager Crozier wrote a memo to Region 3's Realty supervisor to pursue the possibilities of removing Wyandotte National Wildlife Refuge from the Refuge system. Reasons for the request include the probable contamination of Grassy Island, the loss of celery beds, the shift of canvasback and redhead use from the area, and logistics of management.